United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Texas AgriLife Research and Texas Tech University

Soil Survey of Carson County, Texas

How To Use This Soil Survey

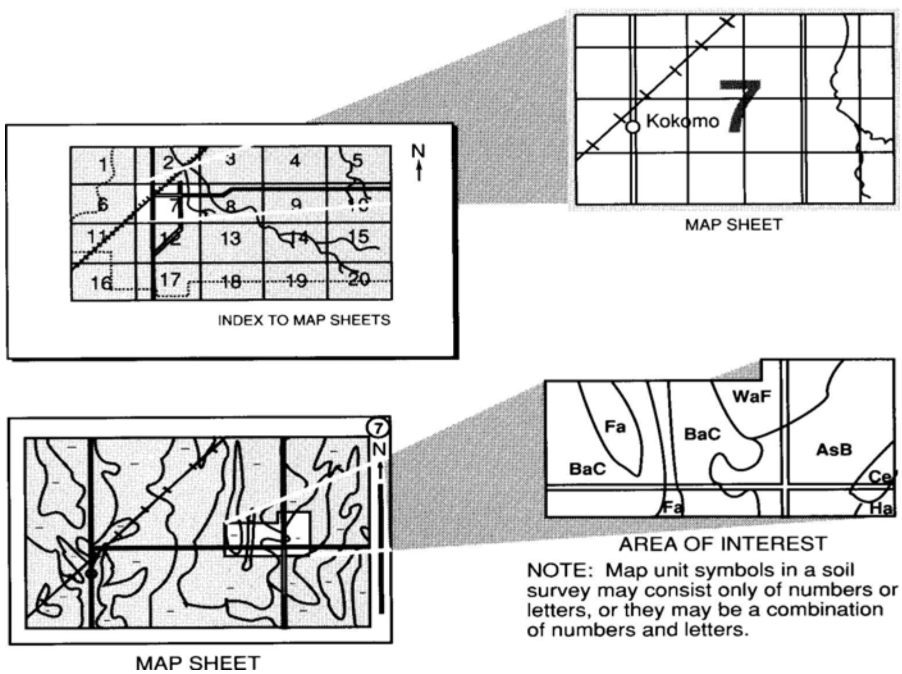
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey special report is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including Texas AgriLife Research (formerly Texas Agricultural Experiment Station), and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey

Major fieldwork for this soil survey was completed in 1999. Soil names and descriptions were approved in 2000. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2000 This survey was made cooperatively by the Natural Resources Conservation Service, Texas AgriLife Research, and Texas Tech University. The survey is part of the technical assistance furnished to the McClellan Creek Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Wheat harvesting in Carson County on a Pullman clay loam, 0 to 1 percent slopes.

Additional information about the Nation’s natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is [*http://www.nrcs.usda.gov*](http://www.nrcs.usda.gov)

Contents

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Foreword

This soil survey contains information that affects land use planning in Carson County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Planners can use the report to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and modify or improve the environment.

The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help users identify and reduce the effects of soil limitations on various land uses. The user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this report. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the report is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Texas AgriLife Extension Service.

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Soil Survey of Carson County, Texas

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Texas AgriLife Research and Texas Tech University

This soil survey updates the soil survey of Carson County published in 1962 *(USDA-SCS, 1962)*. It provides additional soils information and detail on soil properties and interpretations. It also has larger maps, which show the soils in greater detail.

Carson County, in the center of the Panhandle and on the eastern edge of the Texas High Plains, is bounded on the north by Hutchinson County, on the west by Potter County, on the south by Armstrong County, and on the east by Gray County. Carson County was named for Samuel P. Carson, the first Secretary of State of the Republic of Texas. The center of the county is roughly 35°25' north latitude and 101°22' west longitude. *(Handbook of Texas, 1976, 1968)*

Carson County makes up approximately 900 square miles, or 591,072 acres of level prairies and rolling plains. The county is square and about 30 miles from north to south and 30 miles from east to west.

Panhandle is the county seat and has a total resident population of 2,589. Other towns in the county are White Deer, population 1,060; Skellytown, population 610; and Groom, population 587. In 2000, the total resident population for Carson County was 6,516. *(Census 2000)*

Carson County is in Major Land Resource Area 77, the Southern High Plains, and Major Land Resource Area 78, the Southern Rolling Plains and is part of the Central Great Plains Region. *(USDA-SCS, 1981)* The majority of the landscape consists of smooth, nearly level tablelands on a high plateau and breaks. Slopes are linear, neither concave nor convex, and tilted to the east at an average grade of 10 feet per mile. Except for a few low rises and numerous playa depressions, the main surface is smooth. Playas are shallow, dish-shaped depressions that range from 5 acres to over 100 acres in size. They consist of a central basin and an outer rim that slopes to the main surface where runoff is held.

About one-third of the county lies in the Southern High Plains, Breaks. A broad, transitional zone, 8 to 12 miles wide, lies between the High Plains and the Canadian River Breaks. This transitional zone is included with the Southern High Plains. It includes subdued remnant escarpments, hills, ridges, and physiographic terraces that penetrate deeply into the Rolling Plains. Geologic erosion has removed much of the sediment from the High Plains that originally covered the deposits of the Rolling Plains. In places, such as the breaks near the Canadian River, little or no High Plains sediment remains. Here the streams have carved deeply into the colorful Triassic and Permian red beds. *(Levelland COC, 2003)*

Carson County has three small stream channels that dissect the plains. Generally, these streams are dry but occasional flooding can occur briefly during heavy rainfall events. Antelope and Dixon Creeks, both intermittent streams, run northward from central Carson County to their mouths on the Canadian River in Hutchinson County. McClellan Creek, also intermittent, runs eastward across the southeastern corner of the county to join the Red River. *(Handbook of Texas, 1976, 1968)*

The major land uses in Carson County are cropland and rangeland. In 2008, approximately 289,271 acres in the county was used as cropland; 282,907 acres as rangeland and wildlife; 2,113 acres as pasture and hay land; and 16,781 acres as urban or built-up land. *(USDA-NRCS, 2007)*

General Nature of the Survey Area

This section provides general information about the survey area. History, economic enterprises, natural resources, transportation facilities, and climate are described.

History

For this section, information derived from the 1976 and the 1968 versions of the Handbook of Texas.

Prehistoric hunters first occupied the area, and then the Plains Apaches arrived. Modern Apaches followed them and were displaced by Comanches, who dominated the region until the 1870s. Spanish exploring parties, including those of Francisco Vázquez de Coronado in the 1540s and Juan de Oñate in the early 1600s, crisscrossed the Texas Panhandle, but it is not known if they traversed Carson County. American buffalo hunters penetrated the Panhandle in the early 1870s as they slaughtered the great southern herd. The ensuing Indian wars, culminated by the Red River War of 1874, led to the extermination of the buffalo and the removal of the Comanches to Indian Territory. The Panhandle was then opened to settlement. Carson County was established in 1876, when its territory was marked off from the Bexar District.

Ranchers appeared in Carson County in the early 1880s. The JA Ranch of Charles Goodnight and John G. Adair and the Turkey Track Ranch both grazed large ranges in Carson County by 1880. In 1882 Charles G. Francklyn purchased 637,440 acres of railroad lands in Gray, Carson, Hutchinson, and Roberts Counties, 281,000 of them in Carson County. The newly formed Francklyn Land and Cattle Company, with B. B. Groom as manager, attempted to ranch and farm on a large scale, but failed. The lands of the Francklyn Company were sold to the White Deer Lands Trust of British bondholders in 1886 and 1887.

In the later 1880s the railroads reached Carson County. By 1886 the Southern Kansas Railway, a subsidiary of the Atchison, Topeka and Santa Fe, had built from Kiowa, Kansas, to the Texas-Indian Territory border. The Southern Kansas of Texas Railway was formed to extend the line into Texas. Panhandle City, a temporary railhead, was founded in 1887 in anticipation of the railroad line, which finally reached the town in 1888. The town grew, and its occupants hoped that another rail line, the Fort Worth and Denver City, which was building from Fort Worth across the Panhandle to Colorado, would pass through their city. As it happened, the Fort Worth and Denver City missed Panhandle City by fourteen miles to the south, just touching the southwestern corner of the county. In 1889 the two lines were finally linked by a fourteen-mile span between Panhandle City and Washburn, a station on the Fort Worth and Denver City. By 1890 Carson County had a rail network, and its first town, soon known simply as Panhandle; that year, the United States census listed 28 ranches or farms in the area, and 356 people were living in the county.

The establishment of ranches and railroad construction led to a need for local government. A petition for organization was circulated through the county in 1888, and in November of that year an election was held. Panhandle, the county's only town at that

time, was designated the county seat. Despite organization, however, the county remained a ranching area throughout the 1890s, with a small population and only a handful of farmers and stock raisers appearing as the decade wore on. As late as 1900 only 469 people were living in Carson County, and only 56 farms and ranches had been established.

Water had to be brought to Panhandle by railroad from the area of Miami in Roberts County, then carried in barrels on wagons to homesteads. This problem hindered development until it was found that abundant underground water could be pumped to the surface by windmills. That discovery, together with the selling of White Deer lands to small ranchers and farmers in 1902, greatly increased the area's attractiveness. During the next thirty years a modern agricultural economy emerged, based on the production of livestock, wheat, corn, and grain sorghum.

Continued railroad expansion during the first decades of the twentieth century helped to encourage farmers to settle in the area. The Choctaw, Oklahoma and Texas Railroad built from the Texas-Oklahoma Territory border to Yarnall, crossing the southern edge of Carson County on an east-west line. The town sites of Groom, Lark, and Conway appeared at this time along the railroad right-of-way. In 1904 the Chicago, Rock Island and Gulf bought this line. In the early 1900s the Santa Fe Railroad decided to improve its Kansas-Texas-New Mexico line and make it a major transcontinental route. The Santa Fe already had access to the Southern Kansas of Texas line from the Oklahoma Territory border to Panhandle City. In 1908 the Southern Kansas of Texas extended its line from Panhandle City to Amarillo, thus completing the Texas section of the Santa Fe's transcontinental route.

Between 1900 and 1930 farming activity in the county markedly increased. By 1920, 284 farms had been established in the county; by 1920, 426; and by 1930, 542. Meanwhile, the United States Census Bureau reported that the number of "improved" acres in the county had jumped from only 4,663 in 1900 to over 241,620 in 1930. Local farmers concentrated on growing corn, oats, sorghum, and particularly wheat; by 1930 wheat culture occupied more than 182,740 acres. By 1930 242,000 acres, or 42 percent of the entire county, was used for farming. Meanwhile, cattle ranching remained an important component of the economy. Carson County ranchers owned 18,435 cattle in 1900, 22,587 in 1910, 28,370 in 1920, and 16,621 in 1930.

During the 1920s and 1930s the oil and gas industry became another major component of Carson County's economy. Experimental drilling by Gulf Oil Corporation led to the county's, and Panhandle's, first oil and gas production in late 1921. Little activity occurred, however, until the discovery of the huge Borger field, thirty miles north, in 1925, when a wave of oil exploration and production swept the Panhandle, including Carson County. By the end of 1926 the county had produced over a million barrels of oil and had also emerged as a large natural gas producer. Oilfield activity led to renewed railroad construction in the county and to the construction of another town. In 1926 the Panhandle and Santa Fe built a thirty-two-mile spur from Panhandle to Borger to tap the oil profits. In 1927 the same railroad built a ten-mile spur from White Deer to Skellytown, a new town built that year by Skelly Oil to serve a recently constructed refinery. Thus, by the 1930s Carson County had a diversified economy based on ranching, farming, petroleum, and transportation.

As the county's economy developed between 1900 and 1930, its population rose. In 1910 the census counted 2,027 residents in Carson County, and by 1930 the population had increased to 7,745. During the Great Depression of the 1930s, however, agricultural production dropped off, and many local farmers were forced to leave their lands. Cropland harvested in the county dropped from 220,734 acres in 1929 to 180,971 in 1940; the number of farms dropped during the same period from 542 to 493. The population of the county, as a whole, declined by 15 percent during the years of the depression, falling to 6,624 by 1940.

During and since World War II defense spending by the federal government has helped the local economy. In September 1942 the Pantex Ordnance Plant began to manufacture bombs and artillery shells. The plant was on 16,076 acres of southwestern Carson County land, where it operated until August 1945. In 1949 Texas Technological College (now Texas Tech University) acquired the site for use as an agricultural experiment station. During the Korean War, however, the federal government took back more than 10,000 acres of the site for use as a nuclear weapons assembly plant. By the 1980s Pantex had become the only nuclear assembly plant in the country; it employed more than 2,500 people and had been the scene of numerous anti-nuclear protests.

By the 1920s State Highway 33 (now U.S. Highway 60) ran from Oklahoma through Canadian, Pampa, and Panhandle then proceeded to Amarillo, where it joined U.S. Highway 66. During the 1930s paved state roads were built from Panhandle north to Borger and south to Conway, on U.S. Highway 66. Farm and ranch roads also appeared during those years. In the 1960s Interstate Highway 40, from Oklahoma City to Amarillo, was built across the southern portion of the county along the route of old U.S. Highway 66.

Economic Enterprises

Agriculture, agribusiness, oil production, and the Pantex plant are the principal industries in Carson County. Other industries include oil field service and retail trade. In the 2000s, the county's agricultural economy continues to be focused on wheat, corn, and grain sorghum production. Other important agricultural products include forage sorghum, soybeans, and cotton. *(Census, 2002)* Of the 289,271 acres of agricultural land in production about 34 percent of the county’s farmland is irrigated. Cattle and other livestock sales also provide agricultural revenues for the county. Oil production and oilfield service remain a very important part of the economy in Carson County. The Pantex plant is a major boon to the local economy near Panhandle. *(Railroad Commission, 2008)* Many employees at the plant reside in Panhandle.

Though petroleum production in the area has declined, Carson County has remained a substantial producer of oil and gas. In 1946, county wells pumped 4,955,000 barrels of petroleum; in 1978, 1,360,000; in 1990, 747,000; and in 2000, almost 396,500. By the end of 2000 more than 178,398,900 barrels of petroleum had been produced in the county. *(Texas Handbook, 1976 and 1968)*

Carson County therefore has a balanced and diversified economy based on ranching, farming, oil, transportation, and the Pantex plant. Most of the farmland is located in the eastern part of the county, while the western part remains ranchland. In the 1940s and 1950s many local farmers drilled irrigation wells to tap the Ogallala Aquifer, and by the 1980s about 33 percent of cultivated land in the county was irrigated. The local agricultural economy remained relatively static after the 1940s; by 1982, land under cultivation totaled 281,424 acres. The number of farms and farmers declined, however, as mechanization led to a growth in farm size and corresponding decline in the number of farms. In 2002 the county had 363 farms and ranches covering 451,669 acres, 55 percent of which were devoted to crops and 45 percent to pasture. That year farmers and ranchers in the area earned $44,054,000; livestock sales accounted for $29,848,000 of the total. Wheat, sorghum corn, soybeans, and hay were the principal crops. *(Texas Handbook, 1976 and 1968)*

Natural Resources

Soil is the most important natural resource in Carson County. The production of crops, livestock, and forage which are sources of livelihood for many people in the county, all depend on the soil. Deposits of gravel, caliche, and sand are used for the construction of roads and building sites. Oil production is mainly concentrated in the east and northeast part of Carson County near White Deer and Skellytown. Water is another important resource. The Ogallala Aquifer provides water for municipal, industrial, and

agricultural uses. Wildlife, especially waterfowl, is a valuable resource in Carson County. Geese, ducks, and sandhill cranes migrate by the thousands to the High Plains during the winter months. Hundreds of playa lakes provide food and nesting areas for several migratory waterfowl species. Deer and antelope are present in some parts of the county where adequate forage and cover are located. Also of importance are rabbits, dove, quail, and pheasant.

Transportation Facilities

Interstate 40 crosses Carson County from east to west through Lark. U.S. Highway 60 crosses Carson County from northeast to southwest through White Deer and Panhandle. State Highway 207 crosses Carson County from north to south through Pampa, and State Highway 152 crosses the northeast corner of Carson County from northwest to southeast through Skellytown. Farm to Market Roads 295, 294, 2880, 2373, 293, 2161 and many county roads provide ready access to agricultural markets.

The Burlington Northern Santa Fe (BNSF) Railroad crosses northeast to southwest following U.S. Highway 60 through Panhandle. BNSF also crosses from east to west along Interstate 40.

Climate

All climate data used in this summary, including climate tables, were created using a climate station in Amarillo, Texas, in adjoining Potter County. There are no long-term climate stations in Carson County.

Table 1 provides data on temperature and precipitation for the survey area as recorded at Amarillo in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 37.4 degrees F and the average daily minimum temperature is 24.0 degrees. The lowest temperature on record, which occurred at Amarillo on February 1, 1951, was -14 degrees. In summer, the average temperature is 76.2 degrees and the average daily maximum temperature is 89.0 degrees. The highest temperature, which occurred at Amarillo on June 27, 1998, was 108 degrees.

Growing degree days are shown in Table 1. They are equivalent to "heat units". During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is 19.83 inches at Amarillo. Of this, about 16.23 inches, or 82 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.92 inches at Amarillo on June 10, 1984. Thunderstorms occur on about 49 days each year, and most occur between May and August.

The average seasonal snowfall is about 17.8 inches. On average, about 13 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 16.8 inches recorded on December 26, 2000.

The average relative humidity in mid-afternoon is about 40 percent. Humidity is higher at night, and the average at dawn is about 73 percent. The sun shines 78 percent of the time in summer and 69 percent in winter. The prevailing wind is from the south or southwest. Average wind speed is highest, between 15 and 16 miles per hour, in March and April.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a

high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

Careful study of the original soil survey of Carson County was made along with many field observations, before major fieldwork for this soil survey began. From these field observations soil scientists were able to determine where map units in the original survey would remain unchanged, which map units should be eliminated, and which new map units should be added to the update of the Carson County Soil Survey. Soil scientists studied U.S. Geological Survey topographic maps and aerial photographs, relating land and image features. Then the soil scientists made preliminary boundaries of slopes and landforms by stereoscopically plotting the boundaries on aerial photographs.

The soil scientists made traverses by truck on the existing network of roads and trails. Where there were no roads or trails, traverses were made on foot. Soil examinations along the traverses were made every 50 to 1,000 yards, depending on the landscape and soil pattern. The soil was examined with the aid of a hand auger, spade, or power probe to a depth of 5 to 7 feet. Many typical pedons were observed and studied in small pits that were dug by hand. Observations of landforms, surface geology, vegetation, road-cuts, excavations, and animal burrows were made continuously without regard to spacing. Soil boundaries were determined based on soil examinations and photo interpretation.

The soil scientists transected some of the map units to determine their composition and recorded the vegetation. They chose at least three delineations of each transected map unit to be representative of the unit. At least 10 observations 50 to 100 feet apart were made for most transects.

After completion of the field mapping, map unit delineations were transferred by hand to high-altitude aerial photographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from 7½-minute U.S. Geological Survey topographic maps and were recorded from visual observations in the field.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Ady fine sandy loam, 1 to 3 percent slopes, is a phase of the Ady series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Manson-Paloduro association, 1 to 8 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Lincoln soils, 0 to 1 percent slopes, frequently flooded, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Miscellaneous water is an example.

Table 4 provides the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The “Glossary” defines many of the terms used in describing the soils or miscellaneous areas.

Additional information specific to the components of a map unit is available in the Tables section. A complete soil description with range in characteristics is at the following address: http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi. Information about managing a map unit is available in the section on "Soil Properties" and the section on "use and management" which includes subsections on "Crops and Pasture," "Engineering," "Rangeland," "Recreation," and "Wildlife Habitat.”

AdB—Ady fine sandy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Ady and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Ady soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Similar soils include those that have a mollic epipedon. Also included in mapping are Ady soils that have a loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are in small areas and are highly calcareous in all horizons or have a calcic horizon less than 40 inches deep.

Soil Description

Ady

Aspect(s): Northwest
Positions(s) on landform(s): Summit on erosion remnant; Summit on interfluve
Parent material: Loamy slope alluvium derived mainly from the upper part of the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 10 inches; brown, neutral fine sandy loam
Bt—10 to 48 inches; reddish brown, slightly alkaline sandy clay loam
Btk—48 to 65 inches; light reddish brown, moderately alkaline sandy clay loam; about 16 percent calcium carbonate by volume as filaments, masses, and finely disseminated carbonates; violently effervescent
B't—65 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 2 percent films and threads of calcium carbonate, slightly effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.8 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Sandy Loam 16-24" PZ
Ecological site number: R077EY066TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a smaller tall grass complement. Mid grasses tend to dominate over most of the site with sideoats grama being the most prevalent mid grass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. Small areas may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.
Hydric soil status: No

Use and Management

Major land uses: Ady soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland this soil is well suited. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The hazard

of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is well suited to most urban uses. This soil is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The slow water movement and seepage are minor limitations.

Recreational development: This soil is well suited to most recreational uses.

Wildlife habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, is a minor limitation.

AdC—Ady fine sandy loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Ady and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Ady soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Similar soils include those that have a mollic epipedon. Also included in mapping are Ady soils that have a loam surface texture or slopes of 5 to 8 percent.

The contrasting soils are in small areas and are highly calcareous in all horizons or have a calcic horizon less than 40 inches deep.

Soil Description

Ady

Aspect(s): Northwest
Positions(s) on landform(s): Summit on erosion remnant; Backslope on hillslope; Summit on interfluve

Parent material: Loamy slope alluvium derived mainly from the upper part of the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 10 inches; brown, neutral fine sandy loam
Bt—10 to 46 inches; reddish brown, slightly alkaline sandy clay loam
Btk—46 to 63 inches; light reddish brown, moderately alkaline sandy clay loam; about 16 percent calcium carbonate by volume as filaments, masses, and finely disseminated carbonates; violently effervescent
B't—63 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 2 percent films and threads of calcium carbonate, slightly effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.8 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Sandy Loam 16-24" PZ
Ecological site number: R077EY066TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a smaller tall grass complement. Mid grasses tend to dominate over most of the site with sideoats grama being the most prevalent mid grass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevelant. Woody plants are few but include yucca, catclaw acacia, and sand sage.
Hydric soil status: No

Use and Management

Major land uses: Ady soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland this soil is well suited. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where

needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is well suited to most urban uses. It is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The slow water movement and seepage are minor limitations.

Recreational development: This soil is well suited to recreational uses.

Wildlife habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, is a minor limitation.

AtA—Alibates loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Alibates and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Alibates soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Similar soils include those that do not have a mollic epipedon or soils that have a mollic epipedon more than 20 inches thick. Also included in mapping are Alibates soils that have a fine sandy loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are in small areas and are highly calcareous in all horizons or have a calcic horizon less than 40 inches deep.

Soil Description

Alibates

Aspect(s): Northwest
Positions(s) on landform(s): Summit on erosion remnant; Summit on interfluve
Parent material: Calcareous loamy colluvium and/or alluvium

Typical Profile

A—0 to 8 inches; brown, slightly alkaline loam
Bt1—8 to 20 inches; brown, slightly alkaline clay loam; very slightly effervescent
Bt2—20 to 28 inches; brown, moderately alkaline loam; strongly effervescent

Btk1—27 to 62 inches; strong brown, moderately alkaline fine sandy loam; about 12 percent calcium carbonate by volume in the form of filaments and nodules; strongly effervescent

Btk2—62 to 80 inches; strong brown, strongly alkaline fine sandy loam; about 23 percent calcium carbonate by volume in the form of nodules, filaments, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Clay Loam 16-24" PZ
Ecological site number: R077EY051TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Alibates soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.

Cropland: While not extensively used for cropland this soil is well suited. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or

annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is well suited to most urban uses. It is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The slow water movement and seepage are minor limitations.

Recreational development: This soil is well suited to most recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic or off-road vehicles.

Wildlife habitat: Moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

AtB—Alibates loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico

Major land resource area: 77E—Southern High Plains, Breaks

Landscape: Breaks

Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)

Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)

Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)

Frost-free period: 185 to 220 days

Map unit prime farmland class: All areas are prime farmland

Composition

Alibates and similar soils: 85 percent

Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Alibates soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Similar soils include those that do not have a mollic epipedon or soils that have a mollic epipedon more than 20 inches thick. Also included in mapping are Alibates soils that have a fine sandy loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are in small areas and are highly calcareous in all horizons or have a calcic horizon less than 40 inches deep.

Soil Description

Alibates

Aspect(s): Northwest

Positions(s) on landform(s): Summit on erosion remnant; Summit on interfluve

Parent material: Calcareous loamy colluvium and/or alluvium

Typical Profile

A—0 to 7 inches; brown, slightly alkaline loam

Bt1—7 to 19 inches; brown, slightly alkaline clay loam; very slightly effervescent

Bt2—19 to 27 inches; brown, moderately alkaline loam; strongly effervescent

Btk1—27 to 62 inches; strong brown, moderately alkaline fine sandy loam; about 12 percent calcium carbonate by volume in the form of filaments and nodules; strongly effervescent

Btk2—62 to 80 inches; strong brown, strongly alkaline fine sandy loam; about 23 percent calcium carbonate by volume in the form of nodules, filaments, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Clay Loam 16-24" PZ
Ecological site number: R077EY051TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Alibates soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland this soil is well suited. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is well suited to most urban uses. It is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The slow water movement and seepage are minor limitations.
Recreational development: This soil is well suited to most recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material

during dry periods to prevent excessive dustiness due to heavy foot traffic or off-road vehicles.
Wildlife habitat: The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

BcA—Bippus clay loam, 0 to 2 percent slopes, occasionally flooded

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Prime farmland if protected from flooding or not frequently flooded during the growing season

Composition

Bippus and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Bippus soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

Similar soils include those that have a mollic epipedon less than 20 inches thick or soils that have a calcic horizon below 40 inches. Also included in mapping are small areas of Bippus soils that have a loam surface texture or slopes up to 3 percent.

The contrasting soils are in small areas and have less than 18 percent clay in the particle-size control section or are highly calcareous in all horizons and have a calcic horizon less than 40 inches deep.

Soil Description

Bippus

Aspect(s): Northwest
Positions(s) on landform(s): Ephemeral stream on draw
Parent material: Loamy alluvium of Holocene age

Typical Profile

Ap—0 to 14 inches; brown, moderately alkaline clay loam
Bw—14 to 65 inches; brown, moderately alkaline sandy clay loam
Bk—65 to 80 inches; light yellowish brown, moderately alkaline fine sandy loam; about 10 percent calcium carbonate by volume in the form of filaments, masses, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 2 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.5 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: 2w
Ecological site name: Draw 16-24" PZ
Ecological site number: R077EY052TX
Typical vegetation: The natural plant community is dominantly mid grasses with lesser amounts of both tall and short grass species. A few forbs occur along with a few woody plants. The dominant species are western wheatgrass, vine mesquite, and sideoats grama. Blue grama and buffalograss make up most of the short grass complement.
Hydric soil status: No

Use and Management

Major land uses: Bippus soils are used primarily as rangeland and habitat for wildlife. A few small areas are used as improved pasture or cropland.
Cropland: While not extensively used for cropland this soil is well suited. Most areas are so narrow that use as cropland is limited and occasional flooding is a hazard. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield high amounts of forage. Occasional flooding is a minor limitation. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to urban uses. They are very limited as a site for sanitary facilities and building site development. The low soil strength and occasional flooding are major limitations. Overcoming these limitations is difficult and costly.
Recreational development: These soils are moderately suited to most recreational uses. They are very limited as a site for camp areas unless protected from the hazard of flooding. The season, duration, and frequency of flooding should be considered in planning playgrounds and other recreational areas.
Wildlife habitat: Occasional flooding is a minor limitation.

BP—Borrow pits

Setting

General location: Southern High Plains of western Texas, Oklahoma, and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Pits borrow and similar soils: 95 percent
Constrasting soils: 5 percent

Based on field observations of the map unit during the survey, the best estimate is that the Borrow Pits make up 95 percent of the map unit, and other soils make up 5 percent.

Other soils include mine spoil or small areas where soils remained intact and unmined.

Soil Description

Pits Borrow

Aspect(s): Northwest
Positions(s) on landform(s): Borrow pit
Parent material: Caliche mine spoil or earthy fill

Properties and Qualities

Slope: 0 to 45 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.4 inches (Very low)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 8s
Land capability irrigated: None specified
Ecological site name: Not specified
Ecological site number: Not specified
Typical vegetation: Not specified
Hydric soil status: No

Use and Management

Major land uses: This map unit consists of caliche and gravel pits that have been excavated for use mainly as road material. Borrow pits have steep vertical sidewalls, are 10 to 15 feet deep, and range from 5 to 50 acres in size. The exposed soil material in the pits is mainly caliche, gravel, and calcareous soil material.

Cropland: These areas are poorly suited to cropland. The slope, droughtiness, very low available water capacity, high carbonate content, very high runoff, and low natural fertility are major limitations. The hazard of erosion is severe.

Rangeland: The steep slope, very high rate of runoff, low available water capacity, high carbonate content, low natural fertility, and ponding are major limitations. The hazard of erosion is severe.

Urban development: These areas are poorly suited to urban uses. They are very limited for use as sanitary facilities and building site development. The slope, ponding, restricted permeability, droughtiness, gravel, and carbonate content are major limitations.

Recreational development: These areas are poorly suited to recreational uses. They are very limited because of the slope, droughtiness, gravel content, carbonate content, and hazard of ponding are major limitations.

Wildlife habitat: The low available water capacity, surface rock fragments, arid conditions, and ponding are major limitations which restrict plant growth necessary for good habitat. Occasionally these areas are used by transient wildlife that use water here following rainy periods or for cover; however, since there is little or no vegetation, this use is very limited. These areas are severely limited for other uses.

BQG—Burson-Quinlan-Rock outcrop association, 8 to 45 percent slopes

Setting

General location: Central Rolling Red Plains of Texas and Oklahoma
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 1,990 to 3,795 feet (607 to 1,158 meters)
Mean annual precipitation: 15 to 24 inches (381 to 622 millimeters)
Mean annual air temperature: 46 to 74 degrees F (8 to 24 degrees C)
Frost-free period: 185 to 232 days
Map unit prime farmland class: Not prime farmland

Composition

Burson and similar soils: 40 percent
Quinlan and similar soils: 30 percent
Rock Outcrop and similar soils: 20 percent
Constrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Burson soil and similar soils make up 40 percent of the map unit, the Quinlan soil and similar soils make up 30 percent of the map unit, and Rock outcrop makes up 20 percent of the map unit. The contrasting soils make up 10 percent of the map unit.

The soils similar to Burson are 10 to 20 inches to bedrock or have a cambic horizon.

The soils similar to Quinlan are less than 10 inches to densic material or do not have a cambic horizon.

The contrasting soils are in small areas and have a clayey or loamy-skeletal particle-size class or are more than 20 inches to bedrock or densic materials. Also included in this map unit are soils that have slopes greater than 45 percent.

Soil Description

Burson

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on erosion remnant; Backslope on valley side
Parent material: Loamy residuum weathered from sandstone and siltstone of Triassic and/or Permian age

Typical Profile

A—0 to 6 inches; red, moderately alkaline loam; slightly effervescent
Cr—6 to 40 inches; red, weakly cemented very fine grained sandstone and siltstone interbedded with shales and silty shales; slightly effervescent

Properties and Qualities

Slope: 8 to 45 percent
Percent of area covered by surface fragments: About 3 percent subrounded medium and coarse gravel, about 1 percent subangular medium and coarse gravel, about 1 percent (shape or size unspecified)
Depth to first restrictive layer: 6 inches (paralithic bedrock)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 0.9 inches (Very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Rough Breaks 19-26" PZ
Ecological site number: R078BY084TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses. Major grass species include blue grama, hairy grama, tridens, threeawn, black grama, buffalograss, sideoats grama, and little bluestem. Saltbush, ephedra, mesquite, juniper, and catclaw acacia are the major woody species.
Hydric soil status: No

Quinlan

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on erosion remnant; Backslope on valley side
Parent material: Residuum weathered from sandstone and siltstone

Typical Profile

A—0 to 8 inches; reddish brown, moderately alkaline loam; slightly effervescent
Bw—8 to 13 inches; red, moderately alkaline loam; strongly effervescent
Cd—13 to 64 inches; red noncemented, calcareous sandstone bedrock; strongly effervescent

Properties and Qualities

Slope: 8 to 45 percent
Percent of area covered by surface fragments: About 3 percent subrounded medium and coarse gravel, about 1 percent subangular medium and coarse gravel
Depth to first restrictive layer: 13 inches (densic bedrock)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.0 inches (Very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Loamy Prairie 19-26" PZ
Ecological site number: R078BY081TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses. Major grass species include blue grama, buffalograss, sideoats grama, plains bristlegrass, and little bluestem. Saltbush, ephedra, mesquite, juniper, and catclaw acacia are the major woody species.
Hydric soil status: No

Rock Outcrop

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on escarpment; Backslope on valley side

Properties and Qualities

Slope: 8 to 45 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: 0 to 2 inches (lithic bedrock)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Not specified
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About 0.0 inches (Very low)
Natural drainage class: Excessively drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 8s
Land capability irrigated: None specified
Ecological site name: Not specified
Ecological site number: Not specified
Typical vegetation: Not specified
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The slope, depth to bedrock, very low available water capacity, droughtiness, and very high runoff are major limitations. The hazard of water erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. The steep slopes and shallow depth to bedrock is a major limitation for these soils. Low available water capacity and high rate of runoff is a major limitation for both soils. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to most urban uses. They are very limited as a site for building site development and sanitary facilities. The slope, depth to bedrock, and slow water movement are major limitations. Overcoming many of these limitations is difficult and costly.
Recreational development: These soils are poorly suited to most recreational uses. The slope, water erosion, and droughtiness are major limitations.
Wildlife habitat: The slope, depth to bedrock, and droughtiness are major limitations which restrict plant growth necessary for good habitat. The potential for wind and water erosion is severe.

EcA—Estacado clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1,433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Estacado and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Estacado soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Estacado are in small areas and are not calcareous in the surface horizon or have a calcic horizon above 24 inches. Also included in mapping are small areas of Estacado soils that have a loam surface layer or have slopes of 1 to 3 percent.

The contrasting soils are in small areas and do not have an argillic horizon or have a petrocalcic horizon.

Soil Description

Estacado

Aspect(s): Northwest
Positions(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 6 inches; dark grayish brown, moderately alkaline clay loam; sligthtly effervescent
Bt—6 to 38 inches; brown, moderately alkaline clay loam; few fine nodules of calcium carbonate; strongly effervescent
Btk—38 to 50 inches; reddish yellow, moderately alkaline clay loam; about 40 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent
Btkk—50 to 80 inches; pinkish white, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short

grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown are wheat, grain sorghum, and corn. Other crops include cotton, soybeans, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is well suited to most urban uses. It is very limited as a site for construction of roads and streets or use as road-fill material. The low soil strength is a major limitation. Stabilizing, strengthening, or replacing the base material can overcome these restrictions.
Recreational development: This soil is well suited to most recreational uses.
Wildlife habitat: The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

EcB—Estacado clay loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1,433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Estacado and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Estacado soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Estacado are in small areas and are not calcareous in the surface horizon or have a calcic horizon above 24 inches. Also included in mapping are small areas of Estacado soils that have a loam surface layer or have slopes of 3 to 5 percent.

The contrasting soils are in small areas and do not have an argillic horizon or have a petrocalcic horizon.

Soil Description

Estacado

Aspect(s): Northwest
Positions(s) on landform(s): Plain; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 5 inches; dark grayish brown, moderately alkaline clay loam; slightly effervescent
Bt—5 to 37 inches; brown, moderately alkaline clay loam; few fine nodules of calcium carbonate; strongly effervescent
Btk—37 to 49 inches; reddish yellow, moderately alkaline clay loam; about 40 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent
Btkk—49 to 80 inches; pinkish white, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.

Cropland: This soil is well suited to cropland. The most common crops grown are wheat, grain sorghum, and corn. Other crops include cotton, soybeans, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is well suited to most urban uses. It is very limited as a site for construction of roads and streets or use as road-fill material. The low soil strength is a major limitation. Stabilizing, strengthening, or replacing the base material can overcome these restrictions.

Recreational development: This soil is well suited to most recreational uses.

Wildlife habitat: The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

GUA—Guadalupe soils, 0 to 2 percent slopes, occasionally flooded

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Guadalupe and similar soils: 80 percent
Contrasting Soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Guadalupe soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Guadalupe soil that do not have a B horizon within 40 inches of the soil surface or soils that have a sandy particle-size class.

The contrasting soils are in small areas and have a fine-loamy particle-size class or are on higher landscape positions and are not flooded during the year.

Soil Description

Guadalupe

Aspect(s): Northwest
Positions(s) on landform(s): Ephemeral stream on draw
Parent material: Calcareous, sandy alluvium of Holocene age

Typical Profile

Ap—0 to 12 inches; grayish brown, moderately alkaline fine sandy loam; strongly effervescent
Bw1—12 to 25 inches; light yellowish brown, moderately alkaline fine sandy loam; strongly effervescent
Bw2—25 to 38 inches; very pale brown, moderately alkaline sandy clay loam; few films and filaments of calcium carbonate; strongly effervescent
C—38 to 80 inches; very pale brown, moderately alkaline loamy fine sand; strongly effervescent

Properties and Qualities

Slope: 0 to 2 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.7 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Frequent
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: None specified
Ecological site name: Loamy Bottomland 16-24" PZ
Ecological site number: R077EY058TX
Typical vegetation: Not specified
Hydric soil status: No

Use and Management

Major land uses: These soils are used as rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The frequent flooding, droughtiness, low available water capacity, and low natural fertility of the soil are major limitations. The hazard of erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. The low available water capacity and low natural fertility of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual

forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: These soils are poorly suited to urban uses. They are very limited as a site for sanitary facilities, building site development, or lawns and landscaping. The occasional flooding, seepage, and hazard of soil caving are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: These soils are poorly suited to most recreational uses. They are very limited as a site for camp areas, playgrounds, and golf course fairways unless protected from the hazard of flooding. The season, duration, and frequency of flooding should be considered in planning picnic or other recreational areas.

Wildlife habitat: Flooding and droughtiness are minor limitations which can restrict plant growth necessary for good habitat. The potential for wind erosion is severe.

LcA—Lazbuddie clay, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Lazbuddie and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lazbuddie soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Similar soils have an argillic horizon or have a calcic horizon more than 60 inches deep.

The contrasting soils are in small areas and are ponded for longer periods of time or have less than 35 percent clay in the particle-size control section.

Soil Description

Lazbuddie

Aspect(s): Northwest
Positions(s) on landform(s): Circular gilgai on tread on playa step
Parent material: Calcareous, clayey lacustrine deposits of Quaternary age

Typical Profile

Ap—0 to 4 inches; dark grayish brown, moderately alkaline clay; strongly effervescent

Bss1—4 to 13 inches; dark grayish brown, moderately alkaline clay; strongly effervescent

Bss2—13 to 53 inches; dark grayish brown, moderately alkaline clay; strongly effervescent

Bkk—53 to 80 inches; pale yellow, moderately alkaline clay loam; about 60 percent calcium carbonate by volume in the form of masses and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.8 inches (Moderate)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Rare
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3s
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are used for both cropland and as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development and ponding for very brief periods, are minor limitations. The most common crops grown are wheat and grain sorghum. Other crops include cotton and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. High yields of forage can be obtained during favorable years. The clayey texture of the soil, which can restrict root development, is a minor limitation. Other concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The ponding, high shrink-swell potential, slow water movement, and low soil strength are major limitations. Overcoming many of these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: This soil is poorly suited to recreational uses. The high clay content of the soil and very brief ponding are major limitations.
Wildlife habitat: The high clay content is a limitation that affects plant growth necessary for good habitat.

LkD—Likes loamy fine sand, 1 to 8 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Likes and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Likes soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Likes that are noneffervescent throughout the profile or soils that have a coarse-loamy particle-size class. Also included in mapping are small areas of Likes soils that have a fine sand surface texture or slopes of 8 to 12 percent.

The contrasting soils are in small areas and have a lithic contact or a calcic horizon less than 40 inches deep or have 18 to 35 percent clay in the particle-size control section.

Soil Description

Likes

Aspect(s): Northwest
Positions(s) on landform(s): Summit on eroded fan remnant; Backslope on hillslope; Backslope on valley side
Parent material: Calcareous, eolian sands and/or slope alluvium derived mainly from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 10 inches; grayish brown, moderately alkaline loamy fine sand; few very fine calcium carbonate nodules; strongly effervescent
BCk1—10 to 30 inches; brown, moderately alkaline loamy fine sand; few siliceous pebbles; few fine and medium nodules of calcium carbonate; strongly effervescent

BCk2—30 to 80 inches; very pale brown, moderately alkaline fine sand; few fine sandstone and siliceous pebbles; some pebbles have thin coating of calcium carbonate on lower side; few fine nodules of calcium carbonate; violently effervescent

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.6 inches (Low)
Natural drainage class: Excessively drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Sand Hills 16-24" PZ
Ecological site number: R077EY063TX
Typical vegetation: Climax vegetation includes mid and short grasses and some brushes. Cottonwood trees grow in some areas along streams.
Hydric soil status: No

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: This soil is poorly suited to cropland. The slope, high sand content, low available water capacity, droughtiness, and low natural fertility of the soil are major limitations. The hazard of wind erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. The low available water capacity and droughtiness of the soil is a limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is poorly suited to most urban uses. It is very limited for use as sanitary facilities and building site development. The high sand content, poor filtering capacity, seepage, droughtiness, low natural fertility, and low available water holding capacity are major limitations. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: This soil is moderately suited to most recreational uses. The high sand content, slope, and droughtiness are minor limitations.
Wildlife habitat: The droughtiness of the soil and high sand content are major limitations. Wind erosion is a potential hazard for grain and seed crops or wild herbaceous

plants. The moderately arid conditions, which can limit plant growth necessary for good habitat, is a minor limitation.

LNA—Lincoln soils, 0 to 1 percent slopes, frequently flooded

Setting

General location: Central Rolling Red Plains of Texas and Oklahoma
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 3,650 to 4,445 feet (1,113 to 1,356 meters)
Mean annual precipitation: 13 to 21 inches (330 to 533 millimeters)
Mean annual air temperature: 41 to 70 degrees F (5 to 21 degrees C)
Frost-free period: 159 to 211 days
Map unit prime farmland class: Not prime farmland

Composition

Lincoln, frequently flooded and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lincoln soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Lincoln soil that have a cambic horizon within 40 inches of the soil surface or soils that have a coarse-loamy particle-size class.

The contrasting soils are in small areas and have a fine-loamy particle-size class or are on higher landscape positions and are not flooded during the year.

Soil Description

Lincoln, Frequently Flooded

Aspect(s): Northwest
Positions(s) on landform(s): Ephemeral stream on draw
Parent material: Sandy alluvial sediments of Holocene age

Typical Profile

A—0 to 11 inches; brown, moderately alkaline loamy fine sand; slightly effervescent
C—11 to 80 inches; pink, moderately alkaline fine sand; strongly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.9 inches (Low)
Natural drainage class: Somewhat excessively drained
Runoff: Negligible

Flooding frequency: Frequent
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: None specified
Ecological site name: Sandy Bottomland 19-26" PZ
Ecological site number: R078BY087TX
Typical vegetation: This is a tall grass climax. Nearly half of the grass component is composed of tall grasses such as sand or big bluestem along with indiangrass and switchgrass. The remainder of grass vegetation is mid and short grasses such as little bluestem, wildryes, western wheatgrass, sand dropseed, and fall witchgrass. The main forbs include Maximilian sunflower, heath aster, and bundleflowers. Woody shrubs include soapberry, skunkbush, daleas, sand plum, hackberry, and cottonwood.
Hydric soil status: No

Use and Management

Major land uses: These soils are used as rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The frequent flooding, low available water holding capacity and low natural fertility of the soil are major limitations. The hazard of wind erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. Frequent flooding, low available water holding capacity, and low natural fertility of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to urban uses. Flooding is a major limitation. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: These soils are moderately suited to most recreational uses. They are very limited as a site for camp areas, playgrounds, and golf course fairways unless protected from the hazard of flooding. The season, duration, and frequency of flooding should be considered in planning picnic and other recreational areas.
Wildlife habitat: These soils are poorly suited for grain and seed crops as food and cover. Flooding and droughtiness are minor limitations which can restrict plant growth necessary for good habitat. The potential for wind erosion is severe.

LoA—Lofton clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,900 to 4,595 feet (884 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Lofton and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lofton soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Lofton have a calcic horizon below 60 inches or do not have an argillic horizon.

The contrasting soils are in small areas and are ponded for longer periods of time or have less than 35 percent clay in the particle-size control section.

Soil Description

Lofton

Aspect(s): Northwest
Positions(s) on landform(s): Depression; Tread on playa step
Parent material: Clayey sediments derived from the Blackwater Draw Formation of Pleistocene age

Typical Profile

A—0 to 9 inches; dark gray, slightly alkaline clay loam
Bt—9 to 38 inches; dark grayish brown, slightly alkaline clay
Btk—38 to 52 inches; grayish brown, moderately alkaline clay; about 3 percent visible calcium carbonate in the form of filaments and films; strongly effervescent
Bk—52 to 80 inches; grayish brown, moderately alkaline silty clay; about 25 percent calcium carbonate by volume in the form of filaments, masses, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX

Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for cropland. Many areas are also used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development, and occasional ponding are limitations. The most common crops grown on this soil are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is poorly suited to most urban uses. It is very limited for use as sanitary facilities and building site development. The high clay content, restricted permeability, high shrink-swell potential, low strength, and occasional ponding are major limitations. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational development: This soil is poorly suited to recreational uses. They are very limited because of occasional ponding. The season, frequency, and duration of ponding should be considered in planning recreational areas.
Wildlife habitat: The very slow permeability of the soil is a major limitation for grain and seed crops and domestic grasses and legumes used for food and cover. The moderately clayey surface texture is a minor limitation which affects plant growth necessary for good habitat.

LrC—Laverne gravelly loam, 1 to 5 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and the Oklahoma Panhandle
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Laverne and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Laverne soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Laverne that are 20 to 30 inches deep to the petrocalcic horizon and soils that have a fine sandy loam surface texture or less than 15 percent gravel.

The contrasting soils are in small areas and are very deep soils that have a loamy-skeletal particle-size class or soils that do not have a petrocalcic horizon.

Also included in this map unit are borrow pits less than 3 acres in size and areas that have slopes of 5 to 8 percent.

Soil Description

Laverne

Aspect(s): Northwest
Positions(s) on landform(s): Erosion remnant; Interfluve
Parent material: Loamy eolian deposits overlying indurated caliche from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 10 inches; dark grayish brown, moderately alkaline gravelly loam; about 7 percent petrocalcic fragments, slightly effervescent

Bk—10 to 17 inches; grayish brown, moderately alkaline very gravelly loam; about 56 percent angular strongly cemented 2 to 20 mm calcrete fragments by volume; violently effervescent

2Bkkm—17 to 26 inches; white, indurated platy caliche containing a few fractures; laminar in the upper part; thin to thick, concentrically-banded pisolitic structure below the laminar layer; violently effervescent

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 2 percent very angular (shape or size unspecified)
Depth to first restrictive layer: 17 inches (petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.1 inches (Very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Shallow Pe 22-28
Ecological site number: R077XY082OK
Typical vegetation: Not specified
Hydric soil status: No

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: This soil is poorly suited to cropland. The shallow rooting depth, very low available water holding capacity, and droughtiness are major limitations. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield low amounts of forage. The depth to a cemented pan, very low available water holding capacity, and very high runoff are major limitations. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is poorly suited to most urban uses. It is very limited as a site for dwellings with basements, sanitary facilities, shallow excavations, potential source of roadfill material, and lawns and landscaping. The depth to a cemented pan and the high carbonate content of the soils are major limitations. Overcoming many of these limitations is difficult and costly.
Recreational development: This soil is poorly suited to most recreational uses. They are very limited as a site for camp and picnic areas, playgrounds, and golf course fairways. The depth to a cemented pan and high carbonate content of the soil are major limitations.
Wildlife habitat: The droughtiness and very slow permeability of the soil are major limitations which restrict plant growth necessary for good habitat.

LyA—Lockney clay, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Lockney and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lockney soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Lockney have an argillic horizon or a calcic horizon less than 60 inches deep.

The contrasting soils are in small areas and are ponded for longer periods of time or have less than 35 percent clay in the particle-size control section.

Soil Description

Lockney

Aspect(s): Northwest
Positions(s) on landform(s): Circular gilgai on tread on playa step
Parent material: Clayey lacustrine deposits of Quaternary age

Typical Profile

A—0 to 9 inches; very dark grayish brown, moderately alkaline clay
Bw—9 to 17 inches; dark grayish brown, moderately alkaline clay; slightly effervescent
Bss—17 to 67 inches; grayish brown, moderately alkaline clay; slightly effervescent
Bkss—67 to 80 inches; 70 percent light brownish gray and 30 percent very pale brown, moderately alkaline clay; about 5 percent calcium carbonate by volume in the form of masses and nodules; strongly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Rare
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3s
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are used for both cropland and as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development and ponding for very brief periods, are minor limitations.

The most common crops grown are wheat and grain sorghum. Other crops include cotton and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. High yields of forage can be obtained during favorable years. The clayey texture of the soil, which can restrict root development, is a minor limitation. Other concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The ponding, high shrink-swell potential, slow water movement, and low soil strength are major limitations. Overcoming many of these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: This soil is poorly suited to recreational uses. The high clay content of the soil and very brief ponding are major limitations.

Wildlife habitat: The high clay content is a limitation that affects plant growth necessary for good habitat.

M-W—Miscellaneous water

A small constructed pond or pit that is used for industrial, sanitary, or mining applications. It contains water most of the year and is typically 5 to 20 acres in size.

McA—McLean clay, 0 to 1 percent slopes, occasionally ponded

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Mclean and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the McLean soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The soils similar to McLean are wet for longer periods of time or have a calcic horizon between 40 and 80 inches.

The contrasting soils are in small areas and are on slightly higher landscape positions and are dry for longer periods of time or have less than 35 percent clay in the particle-size control section.

Soil Description

Mclean

Aspect(s): Northwest
Positions(s) on landform(s): Circular gilgai on playa floor
Parent material: Clayey lacustrine deposits of Quaternary age

Typical Profile

A—0 to 7 inches; dark gray, moderately alkaline clay
Bss1—7 to 37 inches; dark gray, slightly alkaline clay
Bss2—37 to 59 inches; dark grayish brown, moderately alkaline clay; about 1 percent threads and nodules of calcium carbonate
Bkss—59 to 80 inches; grayish brown, moderately alkaline clay; about 4 percent masses and nodules of calcium carbonate; strongly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Somewhat poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4w
Land capability irrigated: 4w
Ecological site name: Playa 16-21" PZ
Ecological site number: R077CY027TX
Typical vegetation: The natural plant community of a playa is highly variable and dependent on the hydrology of the playa basin being considered. The dominance of

hydrophytic plants or upland plants depends on the degree, frequency, and time of inundation. Vegetation varies according to the amount of water available during the growing season. On average years, the dominant plant community for this site is a mixture of upland grasses and forbs with highly variable amounts of hydrophytic plants present. Very few shrubs or woody plants occur on this site. The most common plants are western wheatgrass, vine mesquite, barnyard grass, buffalograss, bur ragweed, saltmarsh aster, sedges, coreopsis, lambs quarters, cocklebur, curly dock, pennsylvania smartweed, and common spikerush.

Hydric soil status: No

Use and Management

Major land uses: McLean soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland.

Cropland: While not extensively used for cropland this soil is moderately suited. The most common crops grown on this soil are grain sorghum, wheat, cotton, and forage sorghum. The clayey texture of the soil, which can restrict root development and occasional ponding are limitations. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: High yields of forage can be obtained during favorable years. Occasional ponding and the high clay content of the soil are limitations that can restrict plant growth. Other concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. Occasional ponding, high clay content, restricted permeability, high shrink-swell potential, and low strength are major limitations. Overcoming many of these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: This soil is poorly suited to recreational uses. The high clay content of the soil and occasional ponding is very limiting.

Wildlife habitat: The clayey surface texture is a major limitation which affects plant growth necessary for good habitat. Occasional ponding is a minor limitation. Waterfowl such as ducks and geese make occasional use of this habitat for food and cover.

MnB—Manson loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks

Elevation: 2,195 to 3,595 feet (670 to 1,097 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Manson and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Manson soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils are areas of Manson soils that do not have a mollic epipedon or soils that have a fine-loamy particle-size class. Also included in mapping are Manson soils that have a clay loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are in small areas and have a calcic horizon over 30 inches deep, do not have an argillic horizon, or have carbonatic mineralogy.

Soil Description

Manson

Aspect(s): Northwest
Positions(s) on landform(s): Summit on divide; Shoulder on erosion remnant; Backslope on valley side
Parent material: Calcareous loamy colluvium and/or alluvium

Typical Profile

A—0 to 6 inches; brown, slightly alkaline loam; violently effervescent
Bw—6 to 14 inches; brown, moderately alkaline clay loam; violently effervescent
Btk1—14 to 39 inches; brown, strongly alkaline silty clay loam; about 25 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent
Btk2—39 to 80 inches; reddish yellow, strongly alkaline clay loam; about 28 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Hardland Slopes 16-24" PZ
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine messquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Use and Management

Major land uses: Manson soils are used primarily as rangeland and habitat for wildlife. They are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland this soil is moderately suited. The most common crops grown on this soil are grain sorghum, wheat, cotton, and forage sorghum. The high carbonate content of the soil is a limitation. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content of the soil is a limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is well suited to most urban uses. It is very limited as a site for local roads and streets and a potential source of roadfill material. The low soil strength is a major limitation. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades.
Recreational development: This soil is well suited to recreational uses. Dustiness is a minor limitation.
Wildlife habitat: Moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

MoC—Mobeetie fine sandy loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,400 to 4,300 feet (732 to 1,311 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Mobeetie and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Mobeetie soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Mobeetie that have a calcic horizon less than 40 inches deep or soils that have a sandy particle-size class. Also included in mapping are Mobeetie soils that have a loamy fine sand surface texture or slopes of 5 to 8 percent.

The contrasting soils are in small areas and have a fine-loamy particle-size class or have carbonatic mineralogy.

Soil Description

Mobeetie

Aspect(s): Northwest
Positions(s) on landform(s): Toeslope on alluvial fan; Toeslope on valley floor; Footslope on valley side
Parent material: Calcareous, sandy colluvium, and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 8 inches; grayish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; strongly effervescent
Bw—8 to 25 inches; light brown, moderately alkaline fine sandy loam; less than 2 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravels; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
Bk—25 to 41 inches; pink, moderately alkaline fine sandy loam; about 4 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
BCk—41 to 80 inches; pink, moderately alkaline fine sandy loam; about 3 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; violently effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Mixedland Slopes 16-24" PZ
Ecological site number: R077EY061TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The moderate available water holding capacity, low natural fertility, and high carbonate content of the soil are limitations. The hazard of wind erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. Droughtiness and moderate available water holding capacity is a limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are well suited to most urban uses. They are very limited as a site for sewage lagoons. Seepage is a major limitation. Lining the floor and sides of sewage lagoons with relatively impervious material can minimize the potential for contamination of aquifers, streams, and wells.
Recreational development: These soils are well suited to most recreational uses. The slope is a minor limitation for playgrounds.
Wildlife habitat: Droughtiness and moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation. The potential for wind erosion is severe.

MPD—Manson-Paloduro association, 1 to 8 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Manson and similar soils: 45 percent
Paloduro and similar soils: 40 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Manson soil and similar soils make up 45 percent of the map

unit, and the Paloduro soil and similar soils make up 40 percent of the map unit. The contrasting soils make up 15 percent.

The soils similar to Manson soils do not have a mollic epipedon or have a fine-loamy particle-size class.

The soils similar to Paloduro do not have a mollic epipedon or have a calcic horizon less than 40 inches deep.

The contrasting soils in this map unit are in small areas and have carbonatic soil mineralogy or have a coarse-loamy or loamy-skeletal particle-size class.

Also included in mapping are soils that have slopes of 8 to 12 percent.

Soil Description

Manson

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on hillslope
Parent material: Calcareous loamy colluvium and/or alluvium

Typical Profile

A—0 to 5 inches; brown, slightly alkaline loam; violently effervescent
Bw—5 to 14 inches; brown, moderately alkaline clay loam; violently effervescent
Btk1—14 to 39 inches; brown, strongly alkaline silty clay loam; about 25 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent
Btk2—39 to 80 inches; reddish yellow, strongly alkaline clay loam; about 28 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" PZ
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Paloduro

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on hillslope
Parent material: Calcareous loamy colluvium

Typical Profile

A—0 to 12 inches; brown, moderately alkaline clay loam; strongly effervescent
Bw—12 to 32 inches; brown, moderately alkaline clay loam; less than 2 percent by volume of calcium carbonate as films and filaments; strongly effervescent
Bk1—32 to 72 inches; brown, moderately alkaline clay loam; about 5 percent by volume of calcium carbonate as films, filaments, and finely disseminated carbonates; strongly effervescent
Bk2—72 to 80 inches; brown, moderately alkaline clay loam; about 4 percent by volume of calcium carbonate as films, filaments, and finely disseminated carbonates; strongly effervescent

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" PZ
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Use and Management

Major land uses: Manson and Paloduro soils are used primarily as rangeland and habitat for wildlife.
Cropland: These soils are poorly suited to cropland. The slope, runoff, and carbonate content of the soils are major limitations. The hazard of erosion is severe.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing,

fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: These soils are well suited to most urban uses. They are very limited as sites for local roads and streets and a potential source of roadfill material. The low soil strength is a major limitation. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades.

Recreational development: These soils are well suited to recreational uses. Dustiness is a minor limitation.

Wildlife habitat: Moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

MPE—Manson-Paloduro-Potter association, 3 to 12 percent slopes, eroded

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 4,700 feet (670 to 1,433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Manson and similar soils: 40 percent
Paloduro and similar soils: 35 percent
Potter and similar soils: 10 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Manson soil and similar soils make up 40 percent of the map unit, the Paloduro soil and similar soils make up 35 percent, and the Potter soil and similar soils make up 10 percent of the map unit. The contrasting soils make up 15 percent.

The soils similar to Manson do not have a mollic epipedon or have a fine-loamy particle-size class.

The soils similar to Paloduro do not have a mollic epipedon or have a calcic horizon less that 40 inches deep.

The soils similar to Potter have only 25 to 30 percent rock fragments by volume in the particle-size control section.

The contrasting soils in this map unit are in small areas and have a petrocalcic horizon or a coarse-loamy particle-size class. Also included in this map unit are borrow pits less than 3 acres in size and areas that have slopes of 12 to 20 percent.

Soil Description

Manson

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on hillslope
Parent material: Calcareous loamy colluvium and/or alluvium

Typical Profile

A—0 to 5 inches; brown, slightly alkaline loam; violently effervescent
Bw—5 to 14 inches; brown, moderately alkaline clay loam; violently effervescent
Btk1—14 to 39 inches; brown, strongly alkaline silty clay loam; about 25 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent
Btk2—39 to 80 inches; reddish yellow, strongly alkaline clay loam; about 28 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 5 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" PZ
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Paloduro

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on hillslope
Parent material: Calcareous loamy colluvium

Typical Profile

A—0 to 11 inches; brown, moderately alkaline clay loam; strongly effervescent
Bw—11 to 31 inches; brown, moderately alkaline clay loam; less than 2 percent by volume of calcium carbonate as films and filaments; strongly effervescent
Bk1—31 to 72 inches; brown, moderately alkaline clay loam; about 5 percent by volume of calcium carbonate as films, filaments, and finely disseminated carbonates; strongly effervescent

Bk2—72 to 80 inches; brown, moderately alkaline clay loam; about 4 percent by volume of calcium carbonate as films, filaments, and finely disseminated carbonates; strongly effervescent

Properties and Qualities

Slope: 3 to 12 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" PZ
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Potter

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on escarpment; Summit on hillslope
Parent material: Calcareous loamy colluvium

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent

Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent

BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent

BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 3 to 12 percent
Percent of area covered by surface fragments: About 30 percent subangular (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.3 inches (Low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-24" PZ
Ecological site number: R077EY068TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.
Hydric soil status: No

Use and Management

Major land uses: Manson, Paloduro, and Potter soils are used primarily as rangeland and habitat for wildlife.
Cropland: These soils are poorly suited to cropland. The slope, runoff, and high carbonate content of the soils are major limitations. The hazard of erosion is severe.
Rangeland: Native plants are dominantly short grasses which produce moderate amounts of forage. The Potter soil is poorly suited to rangeland. Native plants yield low amounts of forage. The high carbonate content of the soil, low available water capacity, slope, and high rate of runoff are major limitations. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: Manson and Paloduro soils are moderately suited to most urban uses. Paloduro soils are very limited as a site for small commercial buildings and sewage lagoons. The slope is a major limitation. Both soils are very limited as sites for local roads and streets and a potential source of roadfill material. The low soil

strength is a major limitation. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades. The Potter soil is poorly suited to urban uses. It is very limited for use as a site for sanitary facilities, small commercial buildings, lawns and landscaping, or shallow excavations. The slope, slow water movement, caving hazards, and high carbonate content of the soil are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: Manson and Paloduro soils are well suited to most recreational uses. They are very limited as a site for playgrounds. The slope is a major limitation. Potter soils are poorly suited to most recreational uses. They are very limited as a site for playgrounds and golf course fairways. The slope and high carbonate content of the soil are major limitations. Other recreational use such as camp and picnic areas, paths and trails, and off-road motorcycle trails are somewhat limited because of slow water movement, high gravel content, and dustiness of the soil.

Wildlife habitat: The moderately arid conditions of the Manson and Paloduro soils can limit plant growth necessary for good habitat and is a minor limitation. The slope, arid conditions, and droughtiness of the Potter soil are major limitations which restrict plant growth necessary for good habitat. The potential of water erosion for these soils is severe.

MTE—Mobeetie-Tascosa association, 5 to 20 percent slopes

Setting

General location: Southern High Plains, Breaks of west Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 4,300 feet (670 to 1,311 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Mobeetie and similar soils: 50 percent
Tascosa and similar soils: 35 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Mobeetie soil makes up 50 percent of the map unit, the Tascosa soil makes up 35 percent of the map unit, and the contrasting soils make up 15 percent.

The soils similar to Mobeetie have a calcic horizon less than 40 inches deep or have a sandy particle-size class.

The soils similar to Tascosa have a sandy-skeletal particle-size class or have only 25 to 30 percent rock fragments by volume in the particle-size control section.

The contrasting soils are in small areas and have a fine-loamy particle-size class or have carbonatic mineralogy. Also included in this map unit are borrow pits less than 3 acres in size and areas that have slopes of 20 to 30 percent.

Soil Description

Mobeetie

Aspect(s): Northwest
Positions(s) on landform(s): Erosion remnant; Backslope on hillslope
Parent material: Calcareous, sandy colluvium and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 8 inches; grayish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; strongly effervescent
Bw—8 to 25 inches; light brown, moderately alkaline fine sandy loam; less than 2 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravels; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
Bk—25 to 41 inches; pink, moderately alkaline fine sandy loam; about 4 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
BCk—41 to 80 inches; pink, moderately alkaline fine sandy loam; about 3 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; violently effervescent

Properties and Qualities

Slope: 5 to 20 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Mixedland Slopes 16-24" PZ
Ecological site number: R077EY061TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Tascosa

Aspect(s): Northwest
Positions(s) on landform(s): Erosion remnant; Shoulder on hillslope
Parent material: Calcareous sandy and gravelly alluvium

Typical Profile

A—0 to 9 inches; brown, moderately alkaline very gravelly fine sandy loam; about 35 percent by volume of 5 to 76 mm diameter quartzite gravel; strongly effervescent

Bk—9 to 13 inches; pinkish gray, moderately alkaline extremely gravelly loam; about 10 percent calcium carbonate films, filaments, and coatings on the underside of quartzite gravel; about 61 percent by volume of 5 to 76 mm diameter quartzite gravels; strongly effervescent

BCk—13 to 20 inches; pinkish gray, moderately alkaline extremely gravelly loam; about 30 percent calcium carbonate masses and coatings on the underside of quartzite gravel; about 63 percent by volume of 5 to 76 mm diameter quartzite gravels; violently effervescent

C—20 to 80 inches; pink, moderately alkaline very gravelly sandy loam; about 50 percent by volume of 5 to 76 mm diameter quartzite gravels; violently effervescent

Properties and Qualities

Slope: 5 to 20 percent
Percent of area covered by surface fragments: About 50 percent rounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: None specified
Ecological site name: Gravelly 16-24" PZ
Ecological site number: R077EY053TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.

Cropland: These soils are poorly suited to cropland. The slope, available water holding capacity, carbonate content, and high gravel content of Tascosa soils are major limitations. The hazard of erosion is severe.

Rangeland: For the Mobeetie soils, native plants yield moderate amounts of forage. Droughtiness and moderate available water holding capacity is a limitation. The hazard of wind erosion is severe. For the Tascosa soils, native plants yield low amounts of forage. The high gravel content of the soil and low available water holding capacity are limitations. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: These soils are poorly suited to most urban uses. The slope and seepage are major limitations. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: These soils are poorly suited to most recreational uses. They are very limited as a site for camp and picnic areas, playgrounds, and golf course fairways. The slope and the high gravel content of Tascosa soils are major limitations.

Wildlife habitat: The steep slope and droughtiness and the high gravel content of Tascosa soils is a major limitation for grain and seed crops or domestic grasses and legumes used for food and cover. Arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

MVD—Mobeetie-Veal association, 3 to 8 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico

Major land resource area: 77E—Southern High Plains, Breaks

Landscape: Breaks

Elevation: 2,400 to 4,300 feet (732 to 1,311 meters)

Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)

Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)

Frost-free period: 185 to 220 days

Map unit prime farmland class: Not prime farmland

Composition

Mobeetie and similar soils: 55 percent

Veal and similar soils: 30 percent

Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Mobeetie soil makes up 55 percent of the map unit, the Veal soil makes up 30 percent of the map unit, and the contrasting soils make up 15 percent.

The soils similar to Mobeetie have a calcic horizon less than 40 inches deep or have a sandy particle-size class.

The soils similar to Veal have a mollic epipedon or have less than 40 percent calcium carbonate by weight in the control section.

The contrasting soils are in small areas and have a fine-loamy or loamy-skeletal particle-size class or have an argillic horizon. Also included in this map unit are borrow pits less than 3 acres in size and areas that have slopes of 8 to 20 percent.

Soil Description

Mobeetie

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on hillslope
Parent material: Calcareous, sandy colluvium, and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 8 inches; grayish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; strongly effervescent
Bw—8 to 25 inches; light brown, moderately alkaline fine sandy loam; less than 2 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravels; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
Bk—25 to 41 inches; pink, moderately alkaline fine sandy loam; about 4 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
BCk—41 to 80 inches; pink, moderately alkaline fine sandy loam; about 3 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; violently effervescent

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Mixedland Slopes 16-24" PZ
Ecological site number: R077EY061TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little

bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Veal

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on hillslope
Parent material: Calcareous loamy colluvium

Typical Profile

A—0 to 3 inches; brown, slightly alkaline fine sandy loam; about 2 percent by volume of strongly cemented calcium carbonate nodules less than 20 mm in diameter; strongly effervescent
Bk—3 to 13 inches; brown, moderately alkaline gravelly fine sandy loam; about 40 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 25 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent
Bkk1—13 to 54 inches; pink, moderately alkaline very gravelly loam; about 58 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 45 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent
Bkk2—54 to 80 inches; light brown, moderately alkaline gravelly loam; about 52 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 24 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: About 1 percent very angular medium and coarse gravel, about 2 percent subangular medium and coarse gravel, about 1 percent subrounded medium and coarse gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.7 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-24" PZ
Ecological site number: R077EY057TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats

grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The slope, very low to moderate available water holding capacity, moderate to very high runoff, and high carbonate content of the soil are major limitations. The hazard of erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and runoff is a major limitation for Veal soils. Droughtiness and available water holding capacity is a limitation for both of these soils. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are moderately suited to most urban uses. The Mobeetie soils are very limited as a site for sewage lagoons. Seepage is a major limitation. Lining the floor and sides of sewage lagoons with relatively impervious material can minimize the potential for contamination of aquifers, streams, and wells. Veal soils are very limited as a site for lawns and landscaping and daily cover for landfills because of the high calcium carbonate and gravel content of the soil. Veal soils are also very limited as a site for shallow excavations because of the hazard of cutbanks caving. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: These soils are moderately suited to most recreational uses. Both soils are very limited as a site for playgrounds because of steep slopes. The Veal soil is very limited as a site for golf course fairways because of the high carbonate content of the soil.
Wildlife habitat: Arid and droughty conditions which can limit plant growth necessary for good habitat is a minor limitation.

MVE—Mobeetie-Veal-Potter association, 5 to 20 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,295 to 4,700 feet (701 to 1,433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Mobeetie and similar soils: 45 percent
Veal and similar soils: 25 percent

Potter and similar soils: 15 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Mobeetie soil and similar soils make up 45 percent of the map unit, the Veal soil and similar soils make up 25 percent of the map unit, and the Potter soil and similar soils make up 15 percent of the map unit. The contrasting soils make up 15 percent.

The soils similar to Mobeetie have a calcic horizon less than 40 inches deep or have a sandy particle-size class.

The soils similar to Veal have a mollic epipedon or have less than 40 percent calcium carbonate by weight in the control section.

The soils similar to Potter are gravelly soils with slightly less than 35 percent rock fragments by volume in the particle-size control section.

The contrasting soils are in small areas and have a fine-loamy particle-size class or have an argillic horizon. Also included in this map unit are borrow pits less than 3 acres in size, U-shaped gullies, rock outcrops, or areas that have slopes of 20 to 30 percent.

Soil Description

Mobeetie

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on escarpment; Backslope on valley side
Parent material: Calcareous, sandy colluvium, and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 8 inches; grayish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; strongly effervescent
Bw—8 to 25 inches; light brown, moderately alkaline fine sandy loam; less than 2 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravels; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
Bk—25 to 41 inches; pink, moderately alkaline fine sandy loam; about 4 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
BCk—41 to 80 inches; pink, moderately alkaline fine sandy loam; about 3 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; violently effervescent

Properties and Qualities

Slope: 5 to 20 percent
Percent of area covered by surface fragments: About 1 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.4 inches (Moderate)

Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Mixedland Slopes 16-24" PZ
Ecological site number: R077EY061TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Veal

Aspect(s): Northwest
Positions(s) on landform(s): Footslope on escarpment; Backslope on valley side
Parent material: Calcareous, loamy colluvium over slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 3 inches; brown, slightly alkaline fine sandy loam; about 2 percent by volume of strongly cemented calcium carbonate nodules less than 20 mm in diameter; strongly effervescent
Bk—3 to 13 inches; brown, moderately alkaline gravelly fine sandy loam; about 40 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 25 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent
Bkk1—13 to 54 inches; pink, moderately alkaline very gravelly loam; about 58 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 45 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent
Bkk2—54 to 80 inches; light brown, moderately alkaline gravelly loam; about 52 percent of the soil volume is calcium carbonate in the form of masses, nodules, and finely disseminated carbonates; 24 percent by volume of strongly cemented calcium carbonate nodules less than 50 mm in diameter; violently effervescent

Properties and Qualities

Slope: 5 to 20 percent
Percent of area covered by surface fragments: About 2 percent subangular medium and coarse gravel, about 1 percent very angular medium and coarse gravel, about 1 percent subrounded medium and coarse gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.7 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-24" PZ
Ecological site number: R077EY057TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Potter

Aspect(s): Northwest
Positions(s) on landform(s): Summit on escarpment; Backslope on valley side
Parent material: Calcareous, loamy alluvium in the Ogallala Formation of Miocene-Pliocene age.

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent

Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent

BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent

BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 5 to 20 percent
Percent of area covered by surface fragments: About 20 percent angular (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.3 inches (Low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-24" PZ
Ecological site number: R077EY068TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The slope, very low to moderate available water capacity, moderate to very high runoff, high carbonate content, and high gravel content of the soils are major limitations.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and medium to very high runoff is a major limitation for Veal and Potter soils. Droughtiness and available water capacity is a limitation for all of these soils. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to most urban uses. The steep slope, high carbonate and high gravel content of the soils, seepage, slow water movement, and cutbanks caving are major limitations. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: These soils are poorly suited to most recreational uses. They are very limited as a site for camp areas, picnic areas, playgrounds, and golf course fairways. The slope, droughtiness, gravel content, and high carbonate content of the soil are major limitations.
Wildlife habitat: Arid and droughty conditions and steep slopes can limit plant growth necessary for good habitat.

PcB—Pep clay loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1,433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Pep and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pep soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils are not calcareous in the surface horizon or have a gray colored subsoil. Also included in mapping are Pep soils that have a loam surface layer or that have slopes of 3 to 5 percent.

The contrasting soils are in small areas and do not have a mollic epipedon or have an argillic or petrocalcic horizon.

Soil Description

Pep

Aspect(s): Northwest
Positions(s) on landform(s): Plain; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 9 inches; reddish brown, moderately alkaline clay loam; strongly effervescent

Bw—9 to 15 inches; yellowish red, moderately alkaline clay loam; less than 2 percent visible calcium carbonate by volume as films, filaments, and finely disseminated carbonates; strongly effervescent;

Bk—15 to 30 inches; reddish yellow, moderately alkaline clay loam; about 20 percent calcium carbonate by volume as filaments and finely disseminated carbonates; violently effervescent

Bkk—30 to 80 inches; reddish yellow, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Limy Upland 16-21" PZ
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community for this site is dominantly short grass and mid grasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more mid grasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a short and mid grass prairie.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The available water holding capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are wheat, grain sorghum, cotton, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and available water holding capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is moderately suited to most urban uses. It is very limited for use as daily cover for landfills, lawns and landscaping, road-fill material, or the construction of roads and streets. The high carbonate content and low soil strength are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high

corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational development: This soil is moderately suited to most recreational uses. They are very limited as a site for golf course fairways. The available water holding capacity and high carbonate content of the soil is a major limitation.

Wildlife habitat: The moderately arid conditions, which can limit plant growth necessary for good habitat is a minor limitation. Wind erosion is a potential hazard for grain and seed crops used for food and cover.

PcC—Pep clay loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1,433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Pep and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pep soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils are not calcareous in the surface horizon or have a gray colored subsoil. Also included in mapping are Pep soils that have a loam surface layer or that have slopes of 5 to 8 percent.

The contrasting soils are in small areas and do not have a mollic epipedon or an argillic or petrocalcic horizon.

Soil Description

Pep

Aspect(s): Northwest
Positions(s) on landform(s): Backslope on draw; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 8 inches; reddish brown, moderately alkaline clay loam; strongly effervescent

Bw—8 to 15 inches; yellowish red, moderately alkaline clay loam; less than 2 percent visible calcium carbonate by volume as films, filaments, and finely disseminated carbonates; strongly effervescent

Bk—15 to 30 inches; reddish yellow, moderately alkaline clay loam; about 20 percent calcium carbonate by volume as filaments and finely disseminated carbonates; violently effervescent

Bkk—30 to 80 inches; reddish yellow, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 4e
Ecological site name: Limy Upland 16-21" PZ
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community for this site is dominantly short grass and mid grasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more mid grasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a short and mid grass prairie.
Hydric soil status: No

Use and Management

Major land uses: These soils are used primarily as rangeland and habitat for wildlife. They are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland, this soil is moderately suited. The most common crops grown on this soil are grain sorghum, wheat, cotton, and forage sorghum. The available water holding capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and available water holding capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is moderately suited to most urban uses. It is very limited for use as daily cover for landfills, lawns and landscaping, road-fill material, or the construction of roads and streets. The high carbonate content and low soil strength are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational development: This soil is moderately suited to most recreational uses. They are very limited as a site for golf course fairways. The available water holding capacity and high carbonate content of the soil is a major limitation.

Wildlife habitat: The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation. Wind erosion is a potential hazard for grain and seed crops used for food and cover.

PGE—Potter soils, 3 to 20 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,295 to 4,700 feet (701 to 1,433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Potter and similar soils: 85 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Potter soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Potter are gravelly soils with slightly less than 35 percent rock fragments by volume in the particle-size control section.

The contrasting soils are in small areas and have a petrocalcic horizon or a fine-loamy or coarse-loamy particle-size class.

Also included in mapping are Potter soils that have slopes of 20 to 30 percent and borrow pits less than 3 acres in size.

Soil Description

Potter

Aspect(s): Northwest
Positions(s) on landform(s): Shoulder on draw; Shoulder on escarpment
Parent material: Calcareous, loamy alluvium derived from the Ogallala Formation of Miocene-Pliocene age.

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent

Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent

BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent

BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 3 to 20 percent

Percent of area covered by surface fragments: About 20 percent subangular (shape or size unspecified)

Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer

Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About 3.3 inches (Low)

Natural drainage class: Well drained

Runoff: High

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s

Land capability irrigated: None specified

Ecological site name: Very Shallow 16-24" PZ

Ecological site number: R077EY068TX

Typical vegetation: The natural plant community is a mixture of short and mid grasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Hydric soil status: No

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.

Cropland: These soils are not used as cropland. The low available water holding capacity, high carbonate content, droughtiness, slope, shallow rooting depth, and high rate of runoff are major limitations.

Rangeland: Native plants yield low amounts of forage. The high carbonate content of the soils, low available water capacity, slope, and high rate of runoff are major limitations. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to urban uses. They are very limited for use as a site for sanitary facilities, small commercial buildings, lawns and landscaping, or shallow excavations. The slope, slow water movement, caving hazards, and high carbonate content of the soil are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: These soils are poorly suited to most recreational uses. They are very limited as a site for playgrounds and golf course fairways. The slope and high carbonate content of the soil are major limitations. Other recreational use such as camp and picnic areas, paths and trails, and off-road motorcycle trails are somewhat limited because of slow water movement, high gravel content, and dustiness of the soil.
Wildlife habitat: The slope, arid conditons, and droughtiness of the soil are major limitations which restrict plant growth necessary for good habitat. The potential for water erosion is severe.

PMG—Potter-Mobeetie association, 8 to 45 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,295 to 4,700 feet (701 to 1,433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Potter and similar soils: 45 percent
Mobeetie and similar soils: 40 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Potter soil makes up 45 percent of the map unit, the Mobeetie soil makes up 40 percent of the map unit, and the contrasting soils make up 15 percent.

The soils similar to Potter are gravelly soils with slightly less than 35 percent rock fragments by volume in the particle-size control section.

The soils similar to Mobeetie are areas that have a calcic horizon less than 40 inches deep or soils that have a sandy particle-size class.

The contrasting soils are in small areas and have a petrocalcic horizon or a fine-loamy particle-size class or an argillic horizon. Also included in this map unit are borrow pits less than 3 acres in size and areas that have slopes over 45 percent.

Soil Description

Potter

Aspect(s): Northwest
Positions(s) on landform(s): Summit on escarpment; Backslope on valley side
Parent material: Calcareous, loamy alluvium in the Ogallala Formation of Miocene-Pliocene age.

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent
Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent
BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent
BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 8 to 30 percent
Percent of area covered by surface fragments: About 30 percent subangular (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.3 inches (Low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-24" PZ
Ecological site number: R077EY068TX
Typical vegetation: The natural plant community is a mixture of short and mid grasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama,

slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.
Hydric soil status: No

Mobeetie

Aspect(s): Northwest
Positions(s) on landform(s): Backslope on escarpment; Backslope on valley side
Parent material: Calcareous, sandy colluvium and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 7 inches; grayish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; strongly effervescent
Bw—7 to 25 inches; light brown, moderately alkaline fine sandy loam; less than 2 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravels; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
Bk—25 to 41 inches; pink, moderately alkaline fine sandy loam; about 4 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; few 1 cm in diameter pararock fragments of moderately cemented calcium carbonate; violently effervescent
BCk—41 to 80 inches; pink, moderately alkaline fine sandy loam; about 3 percent by volume of calcium carbonate as films, filaments, and nodules; few siliceous gravel; violently effervescent

Properties and Qualities

Slope: 8 to 45 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7e
Land capability irrigated: None specified
Ecological site name: Mixedland Slopes 16-24" PZ
Ecological site number: R077EY061TX
Typical vegetation: This is a mid and tall grass site with a large variety of forbs and a smaller woody plant component. Major grass species are little bluestem, sideoats grama, sand bluestem, and blue grama. This site differs from a sandy loam site because the limey topsoil promotes an increased growth of sideoats grama and little

bluestem. Sand sagebrush is the major woody species along with yucca and skunkbush.
Hydric soil status: No

Use and Management

Major land uses: These soils are used as rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The steep slope, droughtiness, high runoff, and low available water holding capacity are major limitations. The hazard of erosion is severe.
Rangeland: Native plants yield low amounts of forage. The high carbonate content and very low available water holding capacity is a major limitation for Potter soils. The slope and runoff is a limitation for both soils. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: These soils are poorly suited to urban uses. They are very limited as sites for sanitary facilities or building site development. The slope, seepage, slow water movement, caving hazards, and high carbonate content of the soil are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational development: These soils are poorly suited to most recreational uses. The steep slope, slow water movement, and high carbonate content of the soil are major limitations.
Wildlife habitat: For the Potter soils, arid conditions and droughtiness are major limitations which restrict plant growth necessary for good habitat. For the Mobeetie soils the slope and droughtiness are minor limitations which can limit plant growth necessary for good habitat. The potential for wind and water erosion is severe in both soils.

PnC—Plemons loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains, Breaks of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1,143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Plemons and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Plemons soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Plemons that have a mollic epipedon or soils that have a fine-loamy particle-size class. Also included in mapping are Plemons soils that have a clay loam surface texture or slopes of 5 to 8 percent.

The contrasting soils are in small areas and do not have an argillic horizon, have a calcic horizon over 30 inches deep, or have carbonatic mineralogy.

Soil Description

Plemons

Aspect(s): Northwest
Positions(s) on landform(s): Summit on divide; Shoulder on erosion remnant; Backslope on valley side
Parent material: Calcareous, loamy slope alluvium derived mainly from the upper part of the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 6 inches; brown, moderately alkaline loam; violently effervescent
Btk1—6 to 47 inches; brown, moderately alkaline clay loam; estimated 35 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent
Btk2—47 to 76 inches; strong brown, moderately alkaline clay loam; estimated 18 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent
2Btk3—76 to 80 inches; strong brown, moderately alkaline clay; estimated 4 percent calcium carbonate by volume in the form of filaments and masses; slightly effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-24" PZ
Ecological site number: R077EY057TX
Typical vegetation: This is a transitional site dominated by short grass with a significant mid grass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other mid grasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.
Hydric soil status: No

Use and Management

Major land uses: Plemons soils are used primarily as rangeland and habitat for wildlife. They are not used extensively as cropland or improved pasture.

Cropland: While not extensively used for cropland, this soil is moderately suited. The most common crops grown on this soil are grain sorghum, wheat, and forage sorghum. The high carbonate content of the soil and moderate available water holding capacity are limitations. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and moderate available water holding capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: This soil is moderately suited to most urban uses. It is very limited as a site for septic tank absorption fields, roads and streets, or use as road-fill material. The restricted permeability and low soil strength are major limitations. Restricted permeability may cause failure of septic tank absorption systems, especially during prolonged wet periods. This limitation can be overcome by properly designing the absorption field and by increasing the size of the absorption area. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades.

Recreational development: This soil is well suited to recreational uses. Dustiness is a minor limitation.

Wildlife habitat: This soil has good potential for use as wildlife habitat. Moderately arid conditions, which can limit plant growth necessary for good habitat, is a minor limitation.

PuA—Pullman clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Pullman and similar soils: 90 percent
Constrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pullman soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Pullman are areas of soils that have a calcic horizon deeper than 60 inches or soils that have a linear extensibility of less than 6 in the upper 40 inches of the soil surface. Also included in mapping are Pullman soils that have a silty clay loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are in small areas and have less than 35 percent clay in the particle-size control section or are calcareous in the upper part and have a calcic horizon less than 30 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Pullman

Aspect(s): Northwest
Positions(s) on landform(s): Plain
Parent material: Clayey eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 5 inches; brown, neutral clay loam
Bt—5 to 33 inches; brown, moderately alkaline silty clay loam
Btk1—33 to 52 inches; strong brown, moderately alkaline clay loam; about 3 percent calcium carbonate by volume as films, filaments, and nodules; strongly effervescent
Btk2—52 to 80 inches; reddish yellow, moderately alkaline clay; about 40 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.6 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short

grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Pullman soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown on this soil are corn, wheat, grain sorghum, and cotton. Other crops include soybeans and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is moderately suited to most urban uses. It is very limited as a site for small commercial buildings, dwellings without basements, local roads and streets, septic tank absorption fields, trench sanitary landfills, and use as daily cover for landfills. The high shrink-swell potential, low soil strength, restricted permeability, and high clay content of the soil are major limitations. The shrink-swell can cause cracking of building foundations, brick walls, road surfaces, sidewalks, and pipelines. Adding sand or other non-expansive material can minimize the structural damage caused by shrinking and swelling of the soils. Special treatment is necessary to increase the stability of road subgrades. Foundations generally require extra reinforcement. The slow permeability may cause failure of septic tank absorption systems, especially during prolonged wet periods. This limitation can be overcome by properly designing the absorption field and by increasing the size of the absorption area. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational development: This soil is well suited to most recreational uses.
Wildlife habitat: The slow soil permeability, high clay content, and moderately arid conditions which can limit plant growth necessary for good habitat are minor limitations.

PuB—Pullman clay loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Pullman and similar soils: 90 percent
Constrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pullman soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Pullman are areas of soils that have a calcic horizon deeper than 60 inches or soils that have a linear extensibility of less than 6 in the upper 40 inches of the soil surface. Also included in mapping are Pullman soils that have a silty clay loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are in small areas and have less than 35 percent clay in the particle-size control section or are calcareous in the upper part and have a calcic horizon less than 30 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Pullman

Aspect(s): Northwest
Positions(s) on landform(s): Plain; Playa slope
Parent material: Clayey eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 4 inches; brown, neutral clay loam
Bt—4 to 32 inches; brown, moderately alkaline silty clay loam
Btk1—32 to 51 inches; strong brown, moderately alkaline clay loam; about 3 percent calcium carbonate by volume as films, filaments, and nodules; strongly effervescent
Btk2—51 to 80 inches; reddish yellow, moderately alkaline clay; about 40 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.6 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Pullman soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown on this soil are corn, wheat, grain sorghum, and cotton. Other crops include soybeans and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is moderately suited to most urban uses. It is very limited as a site for small commercial buildings, dwellings without basements, local roads and streets, septic tank absorption fields, trench sanitary landfills, and use as daily cover for landfills. The high shrink-swell potential, low soil strength, restricted permeability, and high clay content of the soil are major limitations. The shrink-swell can cause cracking of building foundations, brick walls, road surfaces, sidewalks, and pipelines. Adding sand or other non-expansive material can minimize the structural damage caused by shrinking and swelling of the soils. Special treatment is necessary to increase the stability of road subgrades. Foundations generally require extra reinforcement. The slow permeability may cause failure of septic tank absorption systems, especially during prolonged wet periods. This limitation can be overcome by properly designing the absorption field and by increasing the size of the absorption area. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational development: This soil is well suited to most recreational uses.
Wildlife habitat: The slow soil permeability, high clay content, and moderately arid conditions which can limit plant growth necessary for good habitat are minor limitations.

PxA—Pantex silty clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Pantex and similar soils: 90 percent
Constrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pantex soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Pantex are areas of soils that have a calcic horizon less than 60 inches or soils that have a linear extensibility of less than 6 in the upper 40 inches of the soil surface. Also included in mapping are Pantex soils that have a clay loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are in small areas and have less than 35 percent clay in the particle-size control section or are calcareous in the upper part and have a calcic horizon less than 30 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Pantex

Aspect(s): Northwest
Positions(s) on landform(s): Plain
Parent material: Clayey eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 7 inches; very dark grayish brown, slightly alkaline silty clay loam
Bt1—7 to 34 inches; very dark grayish brown, moderately alkaline silty clay
Bt2—34 to 71 inches; brown, moderately alkaline silty clay loam; few films and filaments of calcium carbonate; slightly effervescent
Btkk—71 to 80 inches; reddish yellow, moderately alkaline silty clay loam; about 52 percent calcium carbonate by volume in the form of masses, films, and filaments; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 11.2 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Pantex soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown on this soil are corn, wheat, grain sorghum, and cotton. Other crops include soybeans and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is moderately suited to most urban uses. It is very limited as a site for small commercial buildings, dwellings without basements, local roads and streets, and septic tank absorption fields. The high shrink-swell potential, low soil strength, and restricted permeability are major limitations. The shrink-swell can cause cracking of building foundations, brick walls, road surfaces, sidewalks, and pipelines. Adding sand or other non-expansive material can minimize the structural damage caused by shrinking and swelling of the soils. Special treatment is necessary to increase the stability of road subgrades. Foundations generally require extra reinforcement. The slow permeability may cause failure of septic tank absorption systems, especially during prolonged wet periods. This limitation can be overcome by properly designing the absorption field and by increasing the size of the absorption area. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational development: This soil is well suited to most recreational uses.
Wildlife habitat: The slow soil permeability, high clay content, and moderately arid conditions which can limit plant growth necessary for good habitat are minor limitations.

RaA—Randall clay, 0 to 1 percent slopes, frequently ponded

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,195 to 4,595 feet (975 to 1,402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: Not prime farmland

Composition

Randall and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Randall soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The soils similar to Randall are soils that are dry for longer periods of time or soils that have a calcic horizon between 40 and 80 inches.

The contrasting soils are in small areas and have less than 35 percent clay in the particle-size control section.

Soil Description

Randall

Aspect(s): Northwest
Positions(s) on landform(s): Circular gilgai on playa floor
Parent material: Clayey lacustrine deposits of Quaternary age

Typical Profile

A—0 to 9 inches; very dark gray, neutral clay; common masses of iron accumulation in pore linings and on surfaces of peds; few fine iron-manganese masses
Bw—9 to 17 inches; dark gray, neutral clay few masses of iron accumulation in pore linings and on surfaces of peds; few fine iron-manganese masses
Bss—17 to 62 inches; dark gray, neutral clay; few fine iron-manganese masses and concretions
Bkss—62 to 80 inches; dark grayish brown, moderately alkaline clay; about 3 percent masses and nodules of calcium carbonate, slightly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer

Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (High)
Natural drainage class: Poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Frequent
Depth to seasonal water table: Present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6w
Land capability irrigated: None specified
Ecological site name: Playa 16-21" PZ
Ecological site number: R077CY027TX
Typical vegetation: The natural plant community of a playa is highly variable and dependent on the hydrology of the playa basin being considered. The dominance of hydrophytic plants or upland plants depends on the degree, frequency, and time of inundation. Vegetation varies according to the amount of water available during the growing season. On average years, this site is usually inundated and saturated for longer periods. The natural plant community is dominantly a mixture of hydrophytic forbs, grasses, and grasslike plants. The most prevalent species on the site is creeping spikerush, pennsylvania smartweed, saltmarsh aster, bur ragweed, curly dock, bushy knotweed, and sedges. Varying amounts of grasses are present and include knotgrass, barnyard grass, and western wheatgrass. In areas of standing water, southern cattail, softstem bulrush, and spiked arrowhead may be present. Occasionally there will be a few willows and cottonwoods present around the periphery of the playa.
Hydric soil status: Yes

Use and Management

Major land uses: These soils are used primarily for wildlife habitat. A few areas are used as rangeland.
Cropland: This soil is poorly suited to cropland. The frequent ponding, wetness, depth to saturated zone, and clayey texture of the soil can restrict root development and are major limitations.
Rangeland: Frequent ponding is a major limitation and prolonged periods of inundation decrease productivity. Large areas of bare ground are common after extended periods of ponding and require time to reestablish native vegetation. The dominant plant species on these soils yield poor quality forage for livestock use. Proper stocking rates, brush management, and controlled grazing can help improve productivity.
Urban development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The depth to a saturated zone, frequent ponding, high clay content, restricted permeability, high shrink-swell potential, and low strength are major limitations. Overcoming these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: This soil is poorly suited to recreational uses. The depth to a saturated zone, frequent ponding, and high clay content of the soil is very limiting.
Wildlife habitat: The wetness, high clay content, and ponding are major limitations. These limitations affect plant growth necessary for grain and seed crops, domestic grasses, and wild herbaceous grasses. Dove, pheasant, and quail make limited use of this habitat for food and cover. These soils are not limited as sites for wetland plants and when ponded these areas are preferred habitat for waterfowl such as ducks and geese that use these areas for food, water, and cover.

TeB—Texroy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,295 to 3,100 feet (701 to 945 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Texroy and similar soils: 80 percent
Constrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Texroy soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The soils similar to Texroy are soils that have a mollic epipedon less than 20 inches thick or soils that do not have an argillic horizon. Also included in mapping are Texroy soils that have a clay loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are in small areas and are calcareous in all horizons and have a calcic horizon less than 40 inches deep or are slightly lower in the landscape and are occasionally flooded.

Soil Description

Texroy

Aspect(s): Northwest
Positions(s) on landform(s): Draw; Tread on stream terrace
Parent material: Loamy alluvium

Typical Profile

A—0 to 8 inches; dark grayish brown, neutral loam
Bt—8 to 52 inches; dark grayish brown, moderately alkaline loam
Btk—52 to 65 inches; brown, moderately alkaline loam; estimated 5 percent calcium carbonate by volume in the form of filaments, masses, and nodules; violently effervescent
2Bw—65 to 80 inches; brown, moderately alkaline fine sandy loam; about 1 percent films and threads of calcium carbonate, strongly effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.4 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Clay Loam 16-24" PZ
Ecological site number: R077EY051TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: Texroy soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: While not extensively used for cropland, this soil is well suited. The most common crops grown on this soil are grain sorghum, wheat, cotton, and forage sorghums. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban development: This soil is well suited to most urban uses. It is very limited as a site for septic tank absorptions fields, trench sanitary landfills, construction of roads and streets, and a source of roadfill material. The seepage of the bottom layer and low soil strength are major limitations. Stabilizing, strengthening, or replacing the base material on roads can overcome these restrictions.
Recreational development: This soil is well suited to recreational uses.
Wildlife habitat: This soil has no limitations for use as wildlife habitat.

TSD—Tivoli-Springer association, 1 to 8 percent slopes

Setting

General location: Central Rolling Red Plains of Texas and Oklahoma.
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks; Sandhills
Elevation: 1,990 to 4,900 feet (607 to 1,494 meters)
Mean annual precipitation: 15 to 24 inches (381 to 622 millimeters)
Mean annual air temperature: 55 to 64 degrees F (13 to 18 degrees C)
Frost-free period: 180 to 230 days
Map unit prime farmland class: Not prime farmland

Composition

Tivoli and similar soils: 50 percent
Springer and similar soils: 35 percent
Constrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Tivoli soils make up 50 percent of the map unit, the Springer soils make up 35 percent of the map unit, and the contrasting soils make up 15 percent.

The soils similar to Tivoli are soils that are dry in the soil moisture control section for longer periods and have secondary carbonates throughout.

The soils similar to Springer are soils that do not have an argillic horizon or soils that have secondary carbonates throughout.

The contrasting soils are in small areas and have a fine-loamy particle-size class or have a calcic horizon. Also included in this map unit are areas that have slopes of 8 to 12 percent.

Soil Description

Tivoli

Aspect(s): Northwest
Positions(s) on landform(s): Dune
Parent material: Sandy eolian deposits

Typical Profile

A—0 to 7 inches; pale brown, neutral fine sand
C—7 to 80 inches; yellow, neutral fine sand

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (Low)
Natural drainage class: Excessively drained
Runoff: Low
Flooding frequency: None

Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Sand Hills 19-26" PZ
Ecological site number: R078BY085TX
Typical vegetation: The native climax vegetation is sand bluestem, sand dropseed, and sand reedgrass with sandsage brush and skunk brush as woody invaders.
Hydric soil status: No

Springer

Aspect(s): Northwest
Positions(s) on landform(s): Interdune
Parent material: Sandy alluvium and/or eolian deposits

Typical Profile

A—0 to 16 inches; light brown, neutral loamy fine sand
Bt—16 to 42 inches; reddish brown, slightly alkaline fine sandy loam
Eb—42 to 56 inches; reddish yellow, moderately alkaline loamy fine sand
Btb—56 to 80 inches; yellowish red, moderately alkaline fine sandy loam

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Sandy 16-24" PZ
Ecological site number: R077EY064TX
Typical vegetation: The native climax vegetation is mainly little bluestem, sideoats grama, sand bluestem, switchgrass, and sand dropseed.
Hydric soil status: No

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.

Cropland: This soil is poorly suited to cropland. The slope, sand content, low to moderate available water holding capacity, and droughtiness are major limitations. The hazard of wind erosion is severe.

Rangeland: Native plants yield high amounts of forage. Droughtiness and low to moderate available water holding capacity is a limitation. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: These soils are poorly suited to most urban uses. They are very limited as sites for sanitary facilities, lawns and landscaping, or shallow excavations. The filtering capacity, seepage, hazard of cutbanks caving, high sand content and droughtiness of the soils are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in these soils. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational development: The Tivoli soils are poorly suited to most recreational uses. It is very limited because of the high sand content and droughtiness of the soil. Springer soils are well suited to most recreational uses.

Wildlife habitat: The high sand content and droughtiness of the Tivoli soils are major limitations that can limit plant growth necessary for good habitat.

W—Water

A small, natural or constructed, lake, pond, or pit that contains water most of the year. It is typically 5 to 40 acres in size and used mainly for livestock water, migratory waterfowl, and other wildlife.

ZcA—Zita clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1,433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days
Map unit prime farmland class: All areas are prime farmland

Composition

Zita and similar soils: 80 percent
Constrasting soils: 20 percent

Based on field observations of the map unit during the survey, the best estimate is that the Zita soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The soils similar to Zita are soils that have argillic horizons. Also included in mapping are Zita soils that have a surface layer of loam or have slopes of 1 to 3 percent.

The contrasting soils are in small areas where soils are highly calcareous in all horizons or they have a calcic horizon more than 40 inches deep.

Soil Description

Zita

Aspect(s): Northwest
Positions(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 18 inches; dark grayish brown, moderately alkaline clay loam
Bw—18 to 24 inches; light brownish gray, moderately alkaline clay loam; less than 2 percent calcium carbonate nodules by volume; strongly effervescent
Bkk1—24 to 35 inches; white, moderately alkaline clay loam; about 50 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent
Bkk2—35 to 80 inches; very pale brown, moderately alkaline clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" PZ
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few mid grasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.
Hydric soil status: No

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: These soils are well suited to cropland. The moderate available water holding capacity of the soil is a minor limitation. The most common crops grown are grain

sorghum, cotton, and wheat. Other crops include corn, soybeans, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly short grasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban development: These soils are moderately suited to most urban uses. They are very limited as a site for the construction of roads and streets, lawns and landscaping, use as road-fill material, and daily cover for landfills. The low soil strength and high carbonate content are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road subgrades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational development: These soils are moderately suited to most recreational uses. They are very limited however as sites for golf course fairways. The high carbonate content of the soils are a major limitation.

Wildlife habitat: The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 358,975 acres in the survey area, or about 61 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the southern two-thirds portion. About 289,271 acres of this prime farmland is used for crops.

The most important cash crops are wheat, grain sorghum, and corn. Cotton has become an important commodity in Carson County in the past few years due to improved varieties that are drought and/or cold tolerant. Almost 15,000 acres of cotton has been planted.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

AtA—Alibates loam, 0 to 1 percent slopes
AtB—Alibates loam, 1 to 3 percent slopes
BcA—Bippus clay loam, 0 to 2 percent slopes, occasionally flooded

(Prime farmland if protected from flooding or not frequently flooded during the growing season)

EcA—Estacado clay loam, 0 to 1 percent slopes
EcB—Estacado clay loam, 1 to 3 percent slopes
LcA—Lazbuddie clay, 0 to 1 percent slopes
LoA—Lofton clay loam, 0 to 1 percent slopes
LyA—Lockney clay, 0 to 1 percent slopes

PuA—Pullman clay loam, 0 to 1 percent slopes
PuB—Pullman clay loam, 1 to 3 percent slopes
PxA—Pantex silty clay loam, 0 to 1 percent slopes
TeB—Texroy loam, 1 to 3 percent slopes
ZcA—Zita clay loam, 0 to 1 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately well suited, poorly suited*, and *unsuited* or as *good, fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on

the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is also explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Texas AgriLife Extension Service.

Management of Cropland

Carson County has approximately 289,271 acres in cropland. About 34 percent or 99,601 acres are irrigated. The remaining acres are nonirrigated. *(USDA NRCS, 2007)* The major nonirrigated crops are wheat, grain sorghum, cotton, and forage sorghum. The major irrigated crops are corn, wheat, cotton, grain sorghum, and soybeans. Smaller areas of oats and sunflowers may be found. *(Census, 2002)* Corn, wheat, and grain sorghum are the most important cash crops grown in the county.

Irrigation water is drawn from the wells in the Ogallala Aquifer. Surface, subsurface, and sprinkler irrigation systems are used. Most of the surface systems (furrow irrigation) are on nearly level cropland areas and are used less commonly than sprinkler systems. Drip irrigation (subsurface) has become more prevalent as it conserves a greater percent of the water applied to the cropping system. Sprinkler systems include center-pivot systems. Low Elevation Spray Application (LESA) applicators are the most common form of center-pivot systems used in Carson County. The sprinklers are set approximately 12 to 18 inches off the ground.

Irrigation water management is important because of the high cost of pumping water and the need to conserve the water in the Ogallala Aquifer. Irrigation water should be applied at the proper times and in the amounts required by the crop. The timing of irrigation can be determined by the feel and appearance method; by moisture monitoring devices, such as gypsum blocks and tensiometers; and by the moisture accounting method. Crop needs for various growth stages can be determined from consumptive use curves.

Irrigation water should be distributed evenly to all parts of the field. Annual or biennial evaluations of surface and sprinkler irrigation systems are recommended in order to locate inefficiencies in distribution. Where surface systems are used, land leveling, land grading, shortening of irrigation runs, surge irrigation systems, and cutback head irrigation systems can increase the efficiency of water distribution. Replacing worn nozzles can increase the efficiency of sprinkler systems. In addition, operating the systems at the pressures recommended by manufacturers or distributors can ensure a high degree of efficiency.

In all areas of cropland, soil and water conservation are important management concerns. Crop residue management and other measures, such as furrow diking, contour stripcropping, field stripcropping, wind stripcropping, cover cropping, contour farming, and terracing, help to control wind erosion and water erosion, conserve moisture, and maintain or improve tilth. Measures that conserve moisture generally result in higher crop yields.

Crop residue management includes crop residue use, delayed seedbed preparation, and conservation tillage. Leaving crop residue on the surface helps to protect the soil against wind erosion; minimizes soil crusting and the detachment of soil particles, and

thus helps to control runoff and water erosion; reduces the rate at which soil moisture evaporates; improves tilth in the surface layer; and minimizes compaction by farm machinery.

Tillage should be sufficient to prepare a good seedbed and to control weeds without damaging the structure of the soil. Heavy traffic on the soil, especially during wet periods, can cause the formation of a compaction pan by destroying soil structure. Compaction reduces soil porosity and restricts root growth into and through the compacted layer. It limits the ability of the root system of a crop to take up moisture and nutrients. It also increases the amount of moisture and nutrients lost through runoff and erosion. Deep chiseling and controlled traffic patterns can minimize compaction. Roughening the surface through emergency tillage helps to control wind erosion.

Properly applied fertilizer is needed on all cultivated soils. Soil analysis and knowledge of the history of fertilizer application on a field can help in making accurate estimates of the kind and amount of nutrients needed to produce a specific yield. An annual soil analysis can detect a buildup or depletion of required nutrients for each crop. In addition, plant analyses can be used to determine nutrient deficiencies in a growing crop.

Management of Pasture and Hayland

Pasture and hayland make up about 2,000 acres in the county. All 2,000 acres is irrigated each year.

Management of pasture and hayland includes selecting plants that are suited to the soil, applying fertilizer, managing grazing heights for maximum productivity, rotating pastures, and controlling weeds and brush. Efficient water management is important in areas where pasture or hayland is irrigated.

Many highly productive grasses are suitable for improved pasture. The most widely used grasses are kleingrass and improved bermudagrass. Improved bermudagrasses are the most widely grown grasses in areas of irrigated pasture.

Applying fertilizer or planting soil-improving leguminous crops is essential for economical forage production in areas of irrigated pasture and hay. In areas of non-irrigated pasture, fertilizer should be applied when the moisture supply is adequate. All fertilizer should be applied according to the results of soil or plant analysis.

Rotating pastures for proper grazing use is an important management practice. Timely rotation allows for the maximum production of improved grasses. Weeds can be controlled by mowing, by prescribed burning, or by applying approved herbicides.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Texas AgriLife Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system *(USDA 1961)*, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s*, or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5

are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the table 5.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 6, table 7, and table 8 show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are generally favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate

gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings in the tables are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock, or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to

adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Large Animal Carcass Disposal

Table 9 shows the degree and kind of limitations that affect the disposal of large animal carcasses by the pit or trench method. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected of a properly designed and

installed system. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of the individual limitations. The ratings are shown in decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Large animal disposal, pit and large animal disposal, trench, are methods of disposing of dead animals by placing the carcasses in successive layers in an excavated pit or trench. The soil is evaluated from the surface to a depth of 79 inches. Onsite investigation to a greater depth will be needed for final site acceptance. The ratings are based on the soil properties that affect attenuation of suspended, soil solution, and gaseous decomposition products and microorganisms; construction and maintenance of the site; and public health. Improper site selection, design, or installation may cause contamination of ground water, seepage, and contamination of stream systems from surface drainage or floodwater.

The soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations. Pollution is a hazard on soils that are subject to flooding or have a water table within the depth of excavation. These soils cannot be easily excavated. Soils that have high saturated hydraulic conductivity (K-sat) or are shallow to bedrock, ice, a cemented pan, or stones and boulders are limited because these features interfere with the installation, performance, and maintenance of the system. Slope affects road construction, performance of the roads, and the control of surface water around the trench. Also, it can cause difficulty in construction where the trench or pit bottom must be kept level and oriented to follow the contour of the land.

The ease with which the trench or pit is dug and with which a soil can be used as daily and final cover is based largely on soil texture and consistence, which affect workability both when the soil is dry and when it is wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and difficult to place as a uniformly thick cover over a layer of carcasses. The uppermost part of the final cover should be soil material that favors the growth of plants. It should not contain excess sodium or salts and should not be too acid. In comparison with other horizons, the surface layer in most soils has the best workability and the highest content of organic matter. Thus, it may be desirable to stockpile the surface layer for use in the final blanketing of the fill.

Rangeland

J.R. Bell, Rangeland Management Specialist, Amarillo, Texas, prepared this section.

Rangeland is land on which the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing. This includes rangelands in their native state and rangelands that may have been restored by the reseeding of native plants and are being managed now as native rangelands. Plant communities on rangelands are closely related to the kind of soils present. In order to understand and to effectively manage rangeland ecosystems, there must be a good understanding of the interaction between soils, plants, grazing animals, and water.

In the detailed map unit descriptions, the potential natural plant community (also referred to as historic climax) that grows on each map unit is described. A potential natural plant community is an association of plants that are best adapted to the environmental factors of soil, topography, and climate present on a particular site. These plants developed over centuries and have reached equilibrium in relation to the other

factors. These communities are fairly stable with some minor variations because of yearly growing conditions. The historic climax is not static, but the fluctuations are not drastic. In general, the potential natural plant community in the same major land resource area on the same soil will be very similar.

A term used to characterize distinctive kinds of rangeland is the “ecological site” (sometimes called range site). These “sites” produce different natural plant communities than do other “sites.” There will be differences in species, amounts, and proportions of plants from site to site. There are generally a few major species, which characterize a particular site. These are listed under the map unit descriptions. Not every soil is a different ecological site; similar soils will often be in the same site.

As a part of the preparation of a complete resource inventory, it is useful to know if the plant community has undergone changes over time. Many years of livestock grazing, the absence of natural fires, and invasion of plants not originally present in pristine times, and climatic events such as major droughts have all interacted to effect changes in vegetation on our native rangelands. While some of our rangelands have remained very productive and very similar to what they were two hundred years ago, most of the range has declined from its original potential.

How a range is managed will affect the nature of the vegetation as to production, species composition, plant health, and its potential to protect the soil. If grazing is too severe for an extended period, the vigor of individual plants will decline and overall productive capacity will be reduced. Often the more palatable vegetation receives undue pressure and these species begin to disappear. Less desirable species will fill the void and the appearance of the range changes, as well as its capacity to sustain a certain level of stocking. Strong, perennial species may be replaced by weaker perennials or annual species. Stability is affected and the plant community is unable to withstand the extreme climatic variations. Opportunistic brushy and weedy plants often make an appearance. Generally, this process takes place gradually over many years, and the degradation process may take more than one pathway. This is because no two sites are going to respond exactly the same way. Site resilience is different and climatic factors influence the process in ways difficult to predict. Soil deterioration may be accelerated as the plant community declines in stability and in its ability to protect the soil surface. Erosion is increased, lowering productivity even more.

However, many degraded rangelands can be restored through good grazing management practices alone. Prescribed grazing, that is, using an appropriate stocking rate of animals for a specific time period followed by a recovery period or “rest,” is the most needed practice on all native rangelands. The sequence of graze-rest may need adjusting from year to year. In addition, stocking rates need to remain flexible since production of the range is variable. There are other practices used to sustain or improve rangeland productivity. The more common ones are: brush management where woody plants have increased to problem densities and are threatening the overall balance of the site; livestock watering systems to better distribute grazing or browsing; cross-fencing to more efficiently graze larger units of rangeland; and rangeland re-seeding where natural plant communities have deteriorated and an insufficient seed source remains. All these practices should be applied as a part of an overall resource management plan. The planning process consists of planning, monitoring, and re-planning constantly on a year-to-year basis.

In areas that have similar climate and topography, differences in the kind and amount of rangeland vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 10 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil

development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are available in the local offices of the Natural Resources Conservation Service or on the internet at http://esis.sc.egov.usda.gov/.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Importance of Rangeland

The rangeland livestock industry is very important to West Texas agriculture. Native rangelands serve as the foundation of the industry. Not only do rangelands support livestock grazing; they also provide valuable wildlife habitat, recreational opportunities, and watersheds for our lakes, rivers, and streams. This survey area contains about 591,072 acres of which 47.8 percent or 282,907 acres are range or other grazing lands. The size of range units varies from small to very large. Both cow-calf and stocker operations are common. The region, including the Texas Panhandle and South Plains, is part of the largest cattle feeding area in the United States. Locally grown grain crops help sustain this industry, enhancing the area's cropland-agriculture enterprises. Many stocker cattle are pastured on small grain during fall and winter months and are then put in feedlots or grass pasture.

The climate of the region is generally well suited to ranching. In the winter months, cold fronts are frequent in which temperatures drop into the teens or occasionally lower. These fronts may bring snow and ice; however, these periods do not last long. Feeding of hay and supplement in the winter months is necessary. The common supplementation is protein in the form of cottonseed cake or grain cubes. Mineral blocks are often left out year-round. There is little cool-season grass production, and most of the production on the native rangeland occurs from May through October.

Ecological Sites

The county has 19 ecological sites. These are Clay Loam 16-24″ PZ, Deep Hardland 16-21" PZ, Draw 16-24″ PZ, Gravelly 16-24″ PZ, Hardland Slopes 16-24″ PZ, Limy Upland 16-21″ PZ, Limy Upland 16-24″ PZ, Loamy Bottomland 16-24″ PZ, Loamy Prairie 19-26″ PZ, Mixedland Slopes 16-24″ PZ, Playa 16-21″ PZ, Rough Breaks 19-26″ PZ, Sand Hills 16-24″ PZ, Sand Hills 19-26″ PZ, Sandy 16-24″ PZ, Sandy Bottomland 19-26″ PZ, Sandy Loam 16-24″ PZ, Shallow PE 22-28, and Very Shallow 16-24″ PZ.

A typical growth curve for native vegetation representing the percentage of total growth occurring each month would be:

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	2	3	7	20	30	15	5	10	4	2	1

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, roads, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Living snow fences are plantings of mostly evergreen species that protect against drifting snow on private and public roads. Livestock protection plantings are generally narrow evergreen plantings that are shaped to provide protection from harsh winter conditions.

Environmental plantings (farmstead windbreaks) help to beautify and screen houses and other buildings, abate noise, and reduce wind. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well-prepared site and maintained in good condition.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 11 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service, Texas Forest Service, or Texas AgriLife Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 12 and table 13 according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in the tables can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf course fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope,

stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

Charles Coffman, Wildlife Biologist, Natural Resources Conservation Service, Lubbock, Texas, prepared this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining and manipulating the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 14, table 15, and table 16, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. The degree and kind of soil limitation are given for grain and seed crop for food and cover; domestic grasses and legumes for food and cover; upland wild herbaceous plants; upland shrubs and vines; and freshwater wetland plants. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect wildlife habitat. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The elements of wildlife habitat are described in the following paragraphs.

Ratings for *grain and seed crops* for wildlife use as food and cover provide guidelines in the selection of sites that reflect soil properties and plant species necessary to sustain wildlife habitat and not to reflect commercial agronomic production. Soil properties and features that affect the growth of grain and seed crops are soil texture, organic mater content, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or pan, soil moisture and temperature regime, depth to high water table, soil moisture and temperature regime, ponding and flooding, permeability into the soil surface, slope, presence of excess salts, susceptibility of the soil surface to water and wind erosion. Examples of grain and seed crops are corn, wheat, oats, grain sorghum, and millet.

Ratings for *domestic grasses and legumes* for use as wildlife food and cover provide guidelines in the selection of sites that reflect soil properties and plant species necessary to sustain wildlife habitat and not to reflect commercial agronomic production. Soil properties and features that affect the growth of grasses and legumes are soil texture, organic mater content, the amount of rock fragments on or near the soil surface,

available water capacity, depth to bedrock or pan, soil moisture and temperature regime, depth to high water table, soil moisture and temperature regime, ponding and flooding, permeability into the soil surface, slope, presence of excess salts, susceptibility of the soil surface to water and wind erosion. Examples of grasses and legumes are old world bluestem, lovegrass, kleingrass, clover, alfalfa, and Illinois bundleflower.

Ratings for *upland wild herbaceous plants* provide guidelines for determining soil quality as a medium for growing a diverse upland herbaceous plant community which is adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not s dry as in the upland desert areas. Soil properties and features that affect the ability of these species to thrive include soil texture, available water capacity, the presence of excess salts in the soil, soil moisture and temperature regimes, depth to high water table, the presence of rock fragments at the soil surface. Examples of upland wild herbaceous plants are little bluestem, switchgrass, western ragweed, croton, and sideoats grama.

Ratings for *upland shrubs and vines* provide guidelines for determining soil quality as a medium for growing a diverse upland shrub and vine community which is adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not as dry as those in the upland desert area. Soil properties and features that affect the ability of these species to thrive include soil texture, soil organic matter, available water capacity, depth to bedrock or pan, the presence of excess salts in the soil, soil temperature and moisture regime, depth to high water table, and the presence of rock fragments at the soil surface. Examples of upland shrubs and vines are four-wing saltbush, shinnery oak, and flameleaf sumac.

Ratings for *freshwater wetland plants* provide guidelines for determining soil quality as a medium for growing plants which are adapted to wet soil conditions. The soils suitable for this habitat generally occur along marshes, depressions, bottom lands, backwater areas of flood plains, drainages adjacent to streams, springs and seeps or any other landscape position that are not directly affected by moving floodwaters but may have ponded water in some parts of the year. The soil properties and features that affect the ability of freshwater wetland plants to persist include soil texture, soil organic matter content, depth to high water table, ponding, the presence of excess salts in the soil, and soil reaction (pH). Examples of freshwater wetland plants are smartweed, saltgrass, bulrush, knotgrass, cattail, rushes, and sedges.

Hydric Soils

In this section, hydric soils are defined and described.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). The criteria are used to identify a phase of a soil series that normally is also a hydric soil. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil

Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2003) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they generally exhibit certain properties that can be observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1998).

Additional information on hydric soils is available in the local office of the Natural Resources Conservation Service or on line at http://soildatamart.nrcs.usda.gov/.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 17 and table 18 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are

depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Table 19 and table 20 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not

adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include

flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 21 and table 22 show information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

The soils are rated as a *probable* or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 21, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the

material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 23, table 24, and table 25 provide information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; aquifer-fed excavated ponds; constructing grassed waterways and surface drains; constructing terraces and diversions; and tile drains and underground outlets. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other

permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Constructing grassed waterways and surface drains. Grassed waterways and surface drains are natural or constructed channels, generally broad and shallow, that permit otherwise restricted infiltration to occur and will conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Constructing terraces and diversions. Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Tile drains and underground outlets. Tile drains and underground outlets require installation of subterranean plumbing or other outlet devices that would allow proper drainage of excess water within the soil which might otherwise cause management problems, such as buildup of salts from evaporation or a shallow water table. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect installation of tile drains and underground outlets. A restricted rooting depth, toxic substances such as salts and sodium, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Soil interpretations for *irrigation all application methods* evaluate a soil's limitation(s) for irrigation practices. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Irrigation practices are used to provide supplemental water to crops, orchards, vineyards, and vegetables in areas where natural precipitation will not support the production of the crops being grown.

The soil properties and qualities important in design and management of an irrigation practice are sodium adsorption ratio, depth to a seasonal high water table, available

water capacity, air and water permeability, wind erodibility, erosion factor, slope, and flooding. The soil properties and qualities that influence installation and tillage are stones, depth to bedrock or cemented pan, and depth to a seasonal high water table. The properties and qualities that affect performance of the irrigation system are depth to bedrock or cemented pan, bulk density, the sodium adsorption ratio, salinity, and soil reaction.

Soil interpretations for *sprinkler irrigation* evaluate a soil's limitation(s) for sprinkler irrigation systems. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Sprinkler irrigation systems apply irrigation water to a crop through a series of pipes and nozzles and can be either solid set or mobile. Generally, this type of irrigation system is suitable for small grains, row crops, vegetables, and orchards.

The soil properties and qualities important in the design and management of sprinkler irrigation systems are depth, available water holding capacity, sodium adsorption ratio, surface coarse fragments, air and water permeability, salinity, slope, wetness, and flooding. The features that affect performance of the system and plant growth are surface texture and rocks, salinity, sodium adsorption ratio, wetness, erosion potential, and available water holding capacity.

Soil interpretations for *drip or trickle irrigation* evaluate a soil's limitation(s) for surface drip irrigation of crops. This type of irrigation system applies water at a very slow rate near the plants. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Drip or trickle irrigation systems are irrigation systems that supply water to the plant very slowly. Generally, drip irrigation systems are very efficient irrigation technologies in terms of both water and energy use and are suitable for use in some crops.

The soil properties and qualities important in the design and management of drip irrigation systems are depth, wetness, ponding, internal drainage, and flooding. The soil properties and qualities that influence installation are depth, flooding, and ponding. The features that affect performance of the system and plant growth are the amount of salts, lime, gypsum, or sodium.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering soil properties, physical and chemical soil properties, and pertinent soil and water features.

Engineering Soil Properties

Table 26 provides the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(ASTM, 1995)* and the system adopted by the American Association of State Highway and Transportation Officials *(AASHTO, 2004)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the

poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 26.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Soil Properties

Table 27 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle-size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle-sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 27, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In table 27, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 27, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle-size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk

density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K-sat) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K-sat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 29, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 27 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Soil Properties

Table 28 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 29 shows estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep and very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely gray colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency of ponding*. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the

average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 30 shows estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth* to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For *uncoated steel*, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For *concrete*, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons for the survey area are given in table 31 and the results of chemical analysis in table 32. The results of clay mineralogy analysis are in table 33. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. Soil samples were analyzed by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska. Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods. *(USDA NRCS, 1996)*

Coarse materials—2 to 75 mm fraction) weight estimates of the percentages of all material less than 75 mm (3B1).
Sand—(0.05 to 2.0 mm fraction) weight percentages of material less than 2 mm (3A1).
Silt—(0.002 to 0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3 or 1/10 bar (4B1), 15 bars (4B2).
Water-retention difference—between 1/3 bar and 15 bars for whole soil (4C1).
Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h).
Linear extensibility—change in clod dimension based on whole soil (4D).
Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).
Extractable cations—ammonium acetate pH 7.0, ICP; calcium (6N2i), magnesium (6O2h), sodium (6P2f), potassium (6Q2f).
Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Reaction (pH)—1:1 water dilution (8C1f).
Carbonate as calcium carbonate—(fraction less than 2 mm [80 mesh]) manometric (6E1h).
Electrical conductivity—saturation extract (8A3a).
Sodium adsorption ratio (5E).
Clay mineralogy (7a2i)

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(Soil Survey Staff, 1993)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 34 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustalf (*Ust*, meaning burnt, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustalfs.

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aridic* identifies the subgroup that typifies the great group. An example is Aridic Haplustalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, thermic Aridic Haplustalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

The Official Soil Series Description, including the range of important characteristics of the soils for the series in this survey area, are available at the local Natural Resources Conservation Service office or online at http://soils.usda.gov/technical/classification/osd/. The “survey area” as defined is part of a Major Land Resource Area (MLRA). Major Land Resource Areas are geographically associated land resource units. The dominant physical characteristics of an MLRA are land use, elevation and topography, climate, water, soils, and potential natural vegetation. Carson County lies within the Southern High Plains, Southern Part, MLRA-77C; and Southern High Plains, Breaks, MLRA-77E.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil that is typical of the series is described. Most of the Official Series Descriptions are not exclusively located within the boundaries of Carson County but are located in the MLRA survey areas of which Carson County is a part.

The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(USDA, 1993)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(USDA, 1999)* and in "Keys to Soil Taxonomy" *(USDA, 1998)*. Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

It should be noted that the surface texture or another soil property described in the Official Series Description of a soil may not be the same as that found in the typical profile of the detailed soil map unit. However, the typical profile falls within the range of characteristics of the soil series. All soil interpretations in the Carson County soil survey are based on the typical profile description of the detailed soil map unit in the county.

The following is a list of all the soil series in Carson County:

Formation of the Soils

In this section, the factors of soil formation, which have affected the soils of Carson County, are discussed.

Factors of Soil Formation

Soils are three-dimensional bodies on the Earth's surface, which are capable of supporting plants. Soil properties result from the parent material and from additions, removals, transfers, and transformations to the soil caused by climate, living organisms, topography, and time. Human activities may also be important.

The interaction of the five soil-forming factors results in differences among the soils. Climate and living organisms (plants and animals) are the active factors. They act on the parent material by influencing the weathering of rocks and through subsequent transportation of the material by water and wind. They slowly change the parent material into a natural body with genetically related horizons. The effects of climate and living organisms are influenced by the topography. Soils on flood plains, for example, are quite different from those on well drained plains. The parent material also affects the kind of profile that can form and sometimes determines it almost entirely. Finally, time is needed to change parent material into soil. Generally, thousands of years are needed for distinct horizons to form.

Climate

Carson County has a steppe climate and mild winters. The average rainfall is about 20 inches, but the amount varies greatly from year to year. The climate is uniform throughout the county, but its effects on soils have been modified locally by relief and runoff, and the differences generally are not measurably affected by climate.

Because rainfall is low and there are long dry periods, soil development has been slow. Soils are seldom wet below the root zone, and consequently, most of the soils have a horizon of calcium carbonate accumulation. In Ady, Pantex and Pullman soils, the carbonates are leached from the surface and the upper part of the subsoil. Most soils have the layer of calcium carbonate, or caliche, at a depth of 24 to 60 inches. In Pep and Estacado soils, free calcium carbonate is present throughout the profile. Generally, the carbonates have been leached to a depth below 60 inches in the sandier Tivoli soils and soils such as Bippus and Randall, which are in water receiving landscape positions.

Winds have played an important role in the development of the soils of Carson County. Most of the parent sediments were deposited by wind during past geologic periods. Even today, high winds remove and deposit soil particles. Winds also are effective in recharging the soils with calcium carbonate as dust particles, thereby keeping the pH of the soils high. Locally, high winds deposited soil materials on the eastern side of some larger playa basins. Pep soils have formed in these deposits.

Warm temperatures have restricted the accumulation of organic matter in most of the soils, although they formed under prairie vegetation. Oxidation tends to accelerate the decomposition of organic matter. Sandy soils, such as Tivoli and Likes, are low in organic matter. Lofton, McLean, and Zita soils are relatively high in organic matter.

Living Organisms

Plants, animals, and microorganisms are important in the formation of soils. The type and amount of plant growth is related to the climate, relief, and parent material. The native vegetation in Carson County is mostly grass; some shrubs and a few small trees are also present. The type of grasses that grow on a particular kind of soil depends partly on the parent material. Short grasses grow on Pullman and similar soils that have high clay content. Tall grasses grow on Likes and Mobeetie and other sandy soils.

Prairie-type vegetation contributes relatively large amounts of organic matter to soils. Grass leaves and stems fall on the soil surface and decay. Roots decompose and distribute organic matter throughout the profile and provide abundant food for microorganisms. Insect casts and voids formed from decaying plant roots add greatly to the movement of air and water through the profile.

Prairie dogs affect soil development by their burrowing activities. The animals churn and mix the soil material. Krotovinas, or soil-filled animal burrows, are common in the subsoil of most of the soils in the county. Such calcareous soils as Manson, Plemons, and Pep have more krotovinas than do most other soils.

Topography

Topography, or lay of the land, influences the formation of soils through its effect on drainage, runoff, and erosion. The topography of Carson County ranges from nearly level, flat areas to steep, dissected areas.

If other factors of soil formation are equal, the degree of profile development depends largely on the moisture that enters the soil system. Soils that have steep slopes absorb less moisture and are more susceptible to erosion than soils in more level areas. Therefore, steeper areas have thinner, less developed soil profiles.

Nearly level to gently sloping soils, such as Estacado, Pantex, and Pullman, permit most of the rainfall to infiltrate; therefore, they are well developed. Burson and Quinlan soils, which have steeper slopes, have high runoff and a large amount of geologic erosion has taken place. As a result,these soils have only weak to moderate soil development.

Soils in low, concave areas also show the influence of relief upon their development. Bippus, Lofton, and Zita soils are darker in color and higher in organic matter than soils in higher areas because extra water has produced more vegetation in these low areas. Soils in poorly drained areas, such as Randall and McLean soils in playas, show the influence of excess water on soil development and profile morphology.

Time

Generally, thousands of years are required for the formation of distinct horizons in soils. Differences in the length of time that parent material has been in place are generally reflected in the degree of development of the soil profile. The soils in Carson County range from weakly developed to well-developed. The weakly developed soils have little horizon development. Conversely, the well-developed soils have well expressed soil horizons. The Mobeetie, Likes, and Tivoli soils are weakly developed soils as reflected in their weak horizonation. Silicate clay accumulation in the B horizons is not perceptible. Estacado, Pantex, and Pullman soils are well-developed. These soils have well-expressed horizons, and silicate clay has been translocated from the surface horizon into the subsoil.

Parent Material

The kind of soil that forms in any given area depends greatly on the kind of parent material in that area. Parent material is the unconsolidated mass from which a soil is formed. It determines the chemical and mineralogical composition of a soil to a considerable extent.

The soils in Carson County developed mostly in a thick eolian mantle which comprises the Blackwater Draw Formation of Pleistocene age. These eolian deposits blanket most of the county. Estacado, Pantex, Pullman, and Zita soils developed in the Blackwater Draw Formation. Pep soils occur in areas that have more calcium carbonate or where calcium carbonate is close to the surface.

McLean and Randall soils formed in clayey lacustrine deposits of Quaternary age on the floor of playa basins. Lazbuddie and Lockney soils have formed in lacustrine deposits of Quaternary age on a playa step surrounding or adjacent to the playa floor.

In the northern portion of Carson County, eolian deposits of the Blackwater Draw Formation are thin. In these areas, part of the Ogallala Formation of Miocene-Pliocene age is exposed. *(anonymous, 1992)*

About one-third of the county lies in the Southern High Plains, Breaks. A broad, transitional zone, 8 to 12 miles wide, lies between the High Plains and the Canadian River Breaks. This transitional zone is included with the Southern High Plains. It includes subdued remnant escarpments, hills, ridges, and physiographic terraces that penetrate deeply into the Rolling Plains. Geologic erosion has removed much of the sediment from the High Plains that originally covered the deposits of the Rolling Plains. In places, such as the breaks near the Canadian River, little or no High Plains sediment remains. Here the streams have carved deeply into the colorful Triassic and Permian red beds. *(Evans and Meade, 1945)*

The top of the Ogallala Formation is a zone of strongly cemented calcium carbonate (calcrete) commonly known as “Caprock Caliche.” Potter and Veal soils have developed in these deposits, mainly along the edge of steep escarpments associated with the Canadian River Breaks. Below the escarpment on a sloping erosional surface, Manson and Plemons soils formed in loamy, calcareous deposits. Paloduro soils developed in loamy, calcareous alluvial and colluvial deposits, while the Mobeetie soils developed on calcareous, sandy alluvium and colluvium from the Ogallala Formation. Bippus soils developed in loamy alluvial sediments in the bottom of draws or flood plains, while Guadalupe soils developed more recently in calcareous, moderately coarse-textured alluvium in incised stream channels. Burson and Quinlan soils formed in loamy residuum from sandstones and siltstones of Triassic and/or Permian age. Tivoli and Springer soils formed in sandy eolian sediments on dunes and interdunes of stream terraces on alluvial plains. *(USDA SCS, 1962)*

Processes of Soil Formation

The soil forming factors produce a succession of layers, or horizons, in the soil profile. The horizons differ in one or more properties, such as thickness, color, texture, structure, consistence, porosity, and reaction.

Most profiles have three major horizons. These are the A, B, and C horizons. Several processes are involved in the formation of these horizons. In Carson County, the main processes are the leaching of calcium carbonate and other salts and bases, the accumulation of organic matter, and the formation and translocation of silicate clay minerals. In most of the soils, more than one of these processes have been active in the development of the horizons.

The A horizon is the surface layer. It is the horizon that has the maximum accumulation of organic matter. The soils in Carson County range from low to high in organic matter content. Various dissolved or suspended materials, such as calcium

carbonate, organic matter, salt, and clay, may have been translocated out of the A horizon into the B horizon.

The B horizon lies directly below the A horizon. It is the horizon that has the maximum accumulation of materials moved in solution or suspension, or it is an altered horizon with distinct structure. A Bt horizon has a significant accumulation of silicate clay. Estacado, Pantex, and Pullman soils have a Bt horizon. Subsoil layers that have a distinct structure and little evidence of accumulation of dissolved or suspended materials are designated as Bw horizons. Bippus, Paloduro, and Zita soils have a Bw horizon. A Bk horizon has an accumulation of calcium carbonate, which is commonly called caliche. Mobeetie, Pep, and Paloduro have a Bk horizon. Bkk horizons are pedogenic carbonate accumulations that are characterized by laterally continuous carbonates that have engulfed rock, sand, silt, and clay particles; plugged the macroporosity of the soil horizon with 50 percent or more calcium carbonate; and obliterated the original soil structure. Lazbuddie and Veal have a Bkk horizon. Subsoil layers that have slickensides, which are a direct result from the shrinking and swelling of clay minerals and shear failure commonly at angles of 20 to 60 degrees above horizontal, are designated as Bss horizons. Lazbuddie, Lockney, McLean, and Randall soils have Bss horizons.

The BC horizon demonstrates properties of both the B and C horizon. The B horizon is listed first because it exhibits the dominant properties. It can also be a transitional horizon between the B or C horizons. Mobeetie soils have a BC horizon. A BCk horizon has an accumulation of calcium carbonate, which is commonly called caliche. Likes and Zita soils have a BCk horizon.

The C horizon is little affected by soil-forming processes. It consists mainly of unconsolidated deposits or weathered or soft bedrock that can be dug with a spade when moist. Guadalupe, Tascosa, and Tivoli soils have a C horizon. A Cr layer is weathered or soft bedrock, such as shale, siltstone, sandstone, or weakly cemented bedrock. Burson soils have a Cr layer.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control is extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Cryptogams. Plants in the group of mosses, lichens, and ferns.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct potential natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.
Fine textured soil. Sandy clay, silty clay, or clay.
Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.
Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.
Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.
Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
Forb. Any herbaceous plant not a grass or a sedge.
Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.
Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
Graded stripcropping. Growing crops in strips that grade toward a protected waterway.
Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.
Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.
Ground water. Water filling all the unblocked pores of the material below the water table.
Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as *(1)* accumulation of clay, sesquioxides, humus, or a combination of these; *(2)* prismatic or blocky structure; *(3)* redder or browner colors than those in the A horizon; or *(4)* a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K-sat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Leeward. The side or slope sheltered or located away from the wind; downwind.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch);* and *coarse, more than 15 millimeters (about 0.6 inch)*.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Parna. A term used, especially in southeast Australia and the southwestern USA, for silt and sand-sized aggregrates of eolian clay occurring as sheets.

Peat. Unconsolidated material, largely undecomposed organic matter that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Playa dune. A linear or curvilinear ridge of windblown, granular material (generally sand or parna) removed from the adjacent basin by wind erosion (deflation), and deposited on the leeward (prevailing downwind) margin of a playa, playa basin, or salina basin. The dune may be barren or vegetated.

Playa floor. The lowest extensive, flat to slightly concave surface within a playa basin, consisting of a dry lake bed or lake plain underlain by stratified clay, silt, or sand, and commonly by soluble salts.

Playa lake. A shallow, intermittent lake in an arid or semiarid region, covering or occupying a playa in the wet season but subsequently drying up; an *ephemeral lake* that upon evaporation leaves or forms a playa. Syn: *playa*

Playa rim. The convex, upper margin (shoulder) of a playa basin where the playa slope intersects the surrounding terrain.

Playa slope. The generally concave to slightly convex area within a playa basin that lies between the relatively level playa floor below (or playa step, if present) and the convex playa rim above. Overland flow is typically parallel down slope.

Playa step. The relatively level or gently inclined “terrace-like” bench or toeslope within a large playa basin flanking and topographically higher than the playa floor and below the playa slope; a bench or step-like surface within a playa basin that breaks the continuity of the playa slope and is modified by erosion and/or deposition. Temporary ponding may occur in response to precipitation/runoff events.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salina. (a) A place where crystalline salt deposits are formed or found, such as a salt flat or pan, a salada, or a salt lick; esp. a salt-encrusted playa or a *wet playa*. (b) A body of saline water, such as a salt pond, lake, well, or spring, or a playa lake, that has a high concentration of salts.

Saline lake. An inland body of water situated in an arid or semiarid region, having no outlet to the sea, and containing a high concentration of dissolved salts (principally sodium chloride). See also: *Salina*

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline-Sodic Soil. A soil containing sufficient exchangeable sodium to interfere with the growth of most crop plants and containing appreciable quantities of soluble salts. The exchangeable sodium ratio is greater than 0.15, conductivity of the soil solution, at saturated water content, of >4dSm-1 (at 25º C.) and the pH is usually 8.5 or less in the saturated soil.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca ++ + Mg++. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes, in mm, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy (laminated)*, *prismatic (vertical axis of aggregates longer than horizontal)*, *columnar (prisms with rounded tops)*, *blocky (angular or subangular)*, and *granular. Structureless soils are either single grained (each grain by itself, as in dune sand)* or *massive (the particles adhering without any regular cleavage, as in many hardpans)*.

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.
Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.
Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."
Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.
Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.
Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.
Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.
Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.
Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.
Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.
Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.
Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.
Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.
Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.
Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windward. The side located toward the direction from which the wind is blowing; facing the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Amarillo, Texas)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	48.9	22.0	35.4	76	-1	6	0.64	0.18	1.01	1	4.8
February----	54.1	26.4	40.2	81	0	24	0.55	0.10	0.93	1	3.8
March-------	62.2	33.0	47.6	87	10	87	1.13	0.30	1.90	2	1.9
April-------	70.6	41.3	56.0	92	22	224	1.33	0.25	2.26	3	0.8
May---------	78.6	51.4	65.0	98	34	469	2.62	1.21	3.98	4	0.0
June--------	87.4	60.9	74.2	103	47	726	3.28	1.38	5.26	5	0.0
July--------	91.0	65.2	78.1	103	55	871	2.68	1.24	4.12	4	0.0
August------	88.7	63.9	76.3	100	54	815	2.94	1.20	4.58	5	0.0
September---	81.7	56.3	69.0	98	36	575	1.88	0.54	3.30	3	0.0
October-----	71.8	44.6	58.2	92	24	283	1.50	0.49	2.10	3	0.4
November----	58.4	31.6	45.0	83	10	59	0.68	0.22	1.10	2	2.4
December----	49.8	23.6	36.7	75	0	9	0.61	0.15	0.97	1	3.7
Yearly:											
Average---	70.3	43.4	56.8	---	---	---	---	---	---	---	---
Extreme---	108	-12	---	105	-6	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,148	19.83	17.00	22.53	34	17.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees. F)

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Amarillo, Texas)

Probability	Temperature: 24°F or lower	Temperature: 28°F or lower	Temperature: 32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 8	April 15	April 30
2 years in 10 later than--	April 2	April 10	April 25
5 years in 10 later than--	March 23	April 1	April 17
First freezing temperature in fall:			
1 year in 10 earlier than--	October 30	October 20	October 3
2 years in 10 earlier than--	November 4	October 25	October 9
5 years in 10 earlier than--	November 14	November 3	October 20

Table 3.--Growing Season

(Recorded for the period 1971-2000 at Amarillo, Texas)

Probability	Daily minimum temperature during growing season: Higher than 24°F	Higher than 28°F	Higher than 32°F
	Days	Days	Days
9 years in 10	213	195	163
8 years in 10	220	202	171
5 years in 10	235	214	185
2 years in 10	249	227	199
1 year in 10	257	233	206

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AdB	Ady fine sandy loam, 1 to 3 percent slopes	6,159	1.0
AdC	Ady fine sandy loam, 3 to 5 percent slopes	6,839	1.2
AtA	Alibates loam, 0 to 1 percent slopes	253	*
AtB	Alibates loam, 1 to 3 percent slopes	14,803	2.5
BcA	Bippus clay loam, 0 to 2 percent slopes, occcasionally flooded	8,925	1.5
BP	Borrow pits	191	*
BQG	Burson-Quinlan-Rock outcrop association, 8 to 45 percent slopes	1,424	0.2
EcA	Estacado clay loam, 0 to 1 percent slopes	6,281	1.1
EcB	Estacado clay loam, 1 to 3 percent slopes	26,885	4.5
GUA	Guadalupe soils, 0 to 2 percent slopes, occasionally flooded	3,001	0.5
LcA	Lazbuddie clay, 0 to 1 percent slopes	3,408	0.6
LkD	Likes loamy fine sand, 1 to 8 percent slopes	2,715	0.5
LNA	Lincoln soils, 0 to 1 percent slopes, frequently flooded	194	*
LoA	Lofton clay loam, 0 to 1 percent slopes	17,510	3.0
LrC	Laverne gravelly loam, 1 to 5 percent slopes	1,131	0.2
LyA	Lockney clay, 0 to 1 percent slopes	2,445	0.4
M-W	Miscellaneous water	63	*
McA	McLean clay, 0 to 1 percent slopes, occasionally ponded	5,027	0.9
MnB	Manson loam, 1 to 3 percent slopes	9,172	1.6
MoC	Mobeetie fine sandy loam, 3 to 5 percent slopes	770	0.1
MPD	Manson-Paloduro association, 1 to 8 percent slopes	55,026	9.3
MPE	Manson-Paloduro-Potter association, 3 to 12 percent slopes, eroded	11,830	2.0
MTE	Mobeetie-Tascosa association, 5 to 20 percent slopes	3,741	0.6
MVD	Mobeetie-Veal association, 3 to 8 percent slopes	57,994	9.8
MVE	Mobeetie-Veal-Potter association, 5 to 20 percent slopes	13,265	2.2
PcB	Pep clay loam, 1 to 3 percent slopes	2,235	0.4
PcC	Pep clay loam, 3 to 5 percent slopes	9,151	1.5
PGE	Potter soils, 3 to 20 percent slopes	11,212	1.9
PMG	Potter-Mobeetie association, 8 to 45 percent slopes	6,782	1.1
PnC	Plemons loam, 3 to 5 percent slopes	11,192	1.9
PuA	Pullman clay loam, 0 to 1 percent slopes	87,031	14.7
PuB	Pullman clay loam, 1 to 3 percent slopes	55,019	9.3
PxA	Pantex silty clay loam, 0 to 1 percent slopes	132,431	22.4
RaA	Randall clay, 0 to 1 percent slopes, frequently ponded	11,692	2.0
TeB	Texroy loam, 1 to 3 percent slopes	3,150	0.5
TSD	Tivoli-Springer association, 1 to 8 percent slopes	1,204	0.2
W	Water	87	*
ZcA	Zita clay loam, 0 to 1 percent slopes	834	0.1
	Total	591,072	100.0

* Less than 0.1 percent.

Table 5.--Irrigated and Nonirrigated Yields by Map Unit Component

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Soybeans		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Bu	Bu	Bu	Bu
AdB:												
Ady-----------------	3e	3e	---	---	700.00	---	2,800.00	---	---	---	30.00	---
AdC:												
Ady-----------------	4e	4e	---	---	600.00	---	2,300.00	---	---	---	25.00	---
AtA:												
Alibates------------	3e	2e	---	---	750.00	---	3,000.00	---	---	---	35.00	---
AtB:												
Alibates------------	3e	3e	---	---	700.00	---	2,800.00	---	---	---	30.00	---
BcA:												
Bippus--------------	2w	2w	---	---	800.00	1,600.00	3,200.00	6,400.00	---	---	37.00	75.00
BP:												
Pits, borrow--------	8s	---	---	---	---	---	---	---	---	---	---	---
BQG:												
Burson--------------	7s	---	---	---	---	---	---	---	---	---	---	---
Quinlan-------------	6e	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop--------	8s	---	---	---	---	---	---	---	---	---	---	---
EcA:												
Estacado------------	3e	2e	---	210.00	800.00	1,600.00	3,200.00	6,400.00	---	45.00	37.00	75.00
EcB:												
Estacado------------	3e	2e	---	190.00	700.00	1,400.00	2,725.00	5,450.00	---	40.00	34.00	68.00
GUA:												
Guadalupe-----------	2w	---	---	---	---	---	---	---	---	---	---	---
LcA:												
Lazbuddie-----------	3s	2s	---	190.00	700.00	1,400.00	2,950.00	5,900.00	---	35.00	30.00	60.00
LkD:												
Likes---------------	6e	---	---	---	---	---	---	---	---	---	---	---

Table 5.--Irrigated and Nonirrigated Yields by Map Unit Component--Continued

Map symbol and soil name	Land capability N	Land capability I	Corn N	Corn I	Cotton lint N	Cotton lint I	Grain sorghum N	Grain sorghum I	Soybeans N	Soybeans I	Wheat N	Wheat I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Bu	Bu	Bu	Bu
LNA: Lincoln, frequently flooded	2w	---	---	---	---	---	---	---	---	---	---	---
LoA: Lofton	3e	2s	---	210.00	800.00	1,600.00	3,200.00	6,400.00	---	45.00	37.00	75.00
LrC: Laverne	7s	---	---	---	---	---	---	---	---	---	---	---
LyA: Lockney	3s	2s	---	200.00	750.00	1,500.00	3,100.00	6,200.00	---	40.00	35.00	70.00
M-W: Water, miscellaneous	---	---	---	---	---	---	---	---	---	---	---	---
McA: McLean	4w	4w	---	---	650.00	1,300.00	2,250.00	4,500.00	---	---	30.00	60.00
MnB: Manson	4e	3e	---	---	450.00	---	2,000.00	---	---	---	22.00	---
MoC: Mobeetie	4e	4e	---	---	---	---	---	---	---	---	---	---
MPD: Manson	6e	---	---	---	---	---	25.00	---	---	---	15.00	---
Paloduro	4e	---	---	---	---	---	---	---	---	---	---	---
MPE: Manson	6e	---	---	---	---	---	25.00	---	---	---	15.00	---
Paloduro	6e	---	---	---	---	---	---	---	---	---	---	---
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
MTE: Mobeetie	6e	---	---	---	---	---	---	---	---	---	---	---
Tascosa	6s	---	---	---	---	---	---	---	---	---	---	---

Table 5.--Irrigated and Nonirrigated Yields by Map Unit Component--Continued

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Soybeans		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Bu	Bu	Bu	Bu
MVD:												
Mobeetie	6e	---	---	---	---	---	---	---	---	---	---	---
Veal	6e	---	---	---	---	---	---	---	---	---	---	---
MVE:												
Mobeetie	6e	---	---	---	---	---	---	---	---	---	---	---
Veal	6e	---	---	---	---	---	---	---	---	---	---	---
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
PcB:												
Pep	4e	3e	---	---	450.00	900.00	2,000.00	4,000.00	---	---	22.00	45.00
PcC:												
Pep	6e	4e	---	---	400.00	800.00	1,700.00	3,400.00	---	---	20.00	40.00
PGE:												
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
PMG:												
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
Mobeetie	7e	---	---	---	---	---	---	---	---	---	---	---
PnC:												
Plemons	4e	---	---	---	400.00	---	1,700.00	---	---	---	20.00	---
PuA:												
Pullman	3e	2s	---	230.00	900.00	1,800.00	3,700.00	7,400.00	---	50.00	40.00	80.00
PuB:												
Pullman	3e	3e	---	205.00	800.00	1,600.00	3,150.00	6,300.00	---	50.00	35.00	70.00
PxA:												
Pantex	3e	2s	---	235.00	925.00	1,850.00	3,725.00	7,450.00	---	55.00	42.00	85.00
RaA:												
Randall	6w	---	---	---	---	---	---	---	---	---	---	---
TeB:												
Texroy	3e	3e	---	---	700.00	---	2,725.00	---	---	---	34.00	---

Table 5.--Irrigated and Nonirrigated Yields by Map Unit Component--Continued

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Soybeans		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Bu	Bu	Bu	Bu
TSD:												
Tivoli	6e	---	---	---	---	---	---	---	---	---	---	---
Springer	6e	---	---	---	---	---	---	---	---	---	---	---
W:												
Water	---	---	---	---	---	---	---	---	---	---	---	---
ZcA:												
Zita	3e	2e	---	210.00	800.00	1,600.00	3,200.00	6,400.00	---	45.00	37.00	75.00

Table 6.--Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:					
Ady	85	Not limited		Not limited	
AdC:					
Ady	85	Not limited		Not limited	
AtA:					
Alibates	85	Not limited		Not limited	
AtB:					
Alibates	85	Not limited		Not limited	
BcA:					
Bippus	80	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
BP:					
Pits, borrow	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slope	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slope	1.00
		Droughty	0.99	Droughty	0.99
		Runoff	0.40		
BQG:					
Burson	40	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Slope	1.00	Slope	1.00
		Runoff	0.40		
Quinlan	30	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Shallow to densic materials	1.00	Shallow to densic materials	1.00
		Slope	1.00	Slope	1.00
		Slow water movement	0.50	Slow water movement	0.37
		Runoff	0.40		
Rock outcrop	20	Not rated		Not rated	
EcA:					
Estacado	85	Not limited		Not limited	
EcB:					
Estacado	85	Not limited		Not limited	

Table 6.--Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
GUA:					
Guadalupe	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Leaching	0.45		
LcA:					
Lazbuddie	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
LkD:					
Likes	80	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45		
LNA:					
Lincoln, frequently flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45	Droughty	0.14
		Droughty	0.14		
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
LrC:					
Laverne	80	Very limited		Very limited	
		Depth to cemented pan	1.00	Droughty	1.00
		Droughty	1.00	Depth to cemented pan	1.00
		Runoff	0.40		
LyA:					
Lockney	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Slow water movement	1.00
		Runoff	0.40		
M-W:					
Water, miscellaneous	100	Not rated		Not rated	

Table 6.--Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
McA:					
McLean	80	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
MnB:					
Manson	85	Not limited		Not limited	
MoC:					
Mobeetie	80	Somewhat limited		Not limited	
		Leaching	0.45		
MPD:					
Manson	45	Not limited		Not limited	
Paloduro	40	Not limited		Not limited	
MPE:					
Manson	40	Not limited		Not limited	
Paloduro	35	Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01
Potter	10	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.72	Droughty	0.72
		Slope	0.01	Slope	0.01
MTE:					
Mobeetie	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Leaching	0.45		
Tascosa	35	Somewhat limited		Somewhat limited	
		Droughty	0.33	Droughty	0.33
		Slope	0.16	Slope	0.16
MVD:					
Mobeetie	55	Somewhat limited		Not limited	
		Leaching	0.45		
Veal	30	Not limited		Not limited	
MVE:					
Mobeetie	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Leaching	0.45		
Veal	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 6.--Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
Potter	15	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.72	Droughty	0.72
		Slope	0.63	Slope	0.63
PcB:					
Pep	80	Not limited		Not limited	
PcC:					
Pep	80	Not limited		Not limited	
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.72	Droughty	0.72
		Slope	0.01	Slope	0.01
PMG:					
Potter	45	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Slope	1.00	Slope	1.00
		Droughty	0.72	Droughty	0.72
Mobeetie	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Leaching	0.45		
PnC:					
Plemons	80	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
PuA:					
Pullman	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
PuB:					
Pullman	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
PxA:					
Pantex	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00

Table 6.--Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
RaA:					
Randall	80	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40		
TeB:					
Texroy	80	Not limited		Not limited	
TSD:					
Tivoli	50	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45	Droughty	0.25
		Droughty	0.25		
Springer	35	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45		
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Not limited		Not limited	

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
AdB:					
Ady	85	Not limited		Very limited	
				Seepage	1.00
AdC:					
Ady	85	Somewhat limited		Very limited	
		Too steep for surface application	0.08	Seepage	1.00
AtA:					
Alibates	85	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
AtB:					
Alibates	85	Not limited		Very limited	
				Seepage	1.00
BcA:					
Bippus	80	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
				Seepage	1.00
				Too level	0.50
BP:					
Pits, borrow	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00		
		Too steep for sprinkler application	1.00		
		Droughty	0.99		
BQG:					
Burson	40	Very limited		Very limited	
		Droughty	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	1.00
		Too steep for sprinkler application	1.00		
Quinlan	30	Very limited		Very limited	
		Droughty	1.00	Seepage	1.00

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
		Too steep for surface application	1.00	Too steep for surface application	1.00
		Too steep for sprinkler application	1.00		
		Slow water movement	0.37		
Rock outcrop	20	Not rated		Not rated	
EcA:					
Estacado	85	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
EcB:					
Estacado	85	Not limited		Very limited	
				Seepage	1.00
GUA:					
Guadalupe	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
				Seepage	1.00
				Too level	0.50
LcA:					
Lazbuddie	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.50
LkD:					
Likes	80	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00
		Too steep for surface application	0.32		
LNA:					
Lincoln, frequently flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	0.99	Seepage	1.00
		Droughty	0.14	Too level	0.50
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.68
				Seepage	0.62

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
LrC:					
Laverne	80	Very limited		Very limited	
		Droughty	1.00	Depth to cemented pan	1.00
		Depth to cemented pan	1.00	Seepage	1.00
LyA:					
Lockney	85	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Too level	0.50
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean	80	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.82
MnB:					
Manson	85	Not limited		Very limited	
				Seepage	1.00
MoC:					
Mobeetie	80	Somewhat limited		Very limited	
		Too steep for surface application	0.08	Seepage	1.00
MPD:					
Manson	45	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
Paloduro	40	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
MPE:					
Manson	40	Somewhat limited		Very limited	
		Too steep for surface application	0.68	Seepage	1.00
Paloduro	35	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	0.10	Too steep for surface application	0.22

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
Potter	10	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	0.22
		Droughty	0.72		
		Too steep for sprinkler application	0.10		
MTE:					
Mobeetie	50	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	1.00	Too steep for surface application	1.00
Tascosa	35	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	0.40	Too steep for surface application	0.78
		Droughty	0.33	Cobble content	0.33
MVD:					
Mobeetie	55	Somewhat limited		Very limited	
		Too steep for surface application	0.68	Seepage	1.00
Veal	30	Somewhat limited		Very limited	
		Too steep for surface application	0.68	Seepage	1.00
MVE:					
Mobeetie	45	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	1.00	Too steep for surface application	1.00
Veal	25	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	1.00	Too steep for surface application	1.00

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
Potter	15	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	1.00
		Too steep for sprinkler application	0.78		
		Droughty	0.72		
PcB:					
Pep	80	Not limited		Very limited	
				Seepage	1.00
PcC:					
Pep	80	Somewhat limited		Very limited	
		Too steep for surface application	0.08	Seepage	1.00
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	0.22
		Droughty	0.72		
		Too steep for sprinkler application	0.10		
PMG:					
Potter	45	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	1.00
		Too steep for sprinkler application	1.00		
		Droughty	0.72		
Mobeetie	40	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	1.00	Too steep for surface application	1.00

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
PnC:					
Plemons	80	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	0.08		
PuA:					
Pullman	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Too level	0.68
				Seepage	0.62
PuB:					
Pullman	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.62
PxA:					
Pantex	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Too level	0.68
				Seepage	0.62
RaA:					
Randall	80	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too level	0.82
TeB:					
Texroy	80	Not limited		Very limited	
				Seepage	1.00
TSD:					
Tivoli	50	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00
		Too steep for surface application	0.68		
		Droughty	0.25		
Springer	35	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00

Table 7.--Agricultural Disposal of Wastewater by Irrigation and Overland Flow--Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation		Overland flow of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Not limited		Very limited	
				Seepage	1.00
				Too level	0.68

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
AdB:					
Ady	85	Very limited		Not limited	
		Slow water movement	1.00		
AdC:					
Ady	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.08
AtA:					
Alibates	85	Very limited		Not limited	
		Slow water movement	1.00		
AtB:					
Alibates	85	Very limited		Not limited	
		Slow water movement	1.00		
BcA:					
Bippus	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.60
		Flooding	0.60		
BP:					
Pits, borrow	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	1.00
				Slow water movement	0.96
BQG:					
Burson	40	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	1.00	Too steep for sprinkler irrigation	1.00
Quinlan	30	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
		Slow water movement	1.00	Too steep for sprinkler irrigation	1.00
				Slow water movement	0.26
Rock outcrop--------	20	Not rated		Not rated	
EcA:					
Estacado------------	85	Very limited		Not limited	
		Slow water movement	1.00		
EcB:					
Estacado------------	85	Very limited		Not limited	
		Slow water movement	1.00		
GUA:					
Guadalupe-----------	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.32		
LcA:					
Lazbuddie-----------	85	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
LkD:					
Likes---------------	80	Somewhat limited		Very limited	
		Slope	0.12	Filtering capacity	0.99
				Too steep for surface application	0.32
LNA:					
Lincoln, frequently flooded------------	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
				Filtering capacity	0.99
LoA:					
Lofton--------------	85	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
LrC:					
Laverne-------------	80	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00		

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
LyA:					
Lockney	85	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean	80	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
MnB:					
Manson	85	Very limited		Not limited	
		Slow water movement	1.00		
MoC:					
Mobeetie	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.32	Too steep for surface application	0.08
MPD:					
Manson	45	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		
Paloduro	40	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		
MPE:					
Manson	40	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.68
		Slope	0.50		
Paloduro	35	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	0.22

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
Potter	10	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Slow water movement	0.99
				Too steep for sprinkler irrigation	0.22
MTE:					
Mobeetie	50	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.32	Too steep for sprinkler irrigation	1.00
Tascosa	35	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	1.00	Too steep for sprinkler irrigation	0.78
		Cobble content	0.29		
MVD:					
Mobeetie	55	Somewhat limited		Somewhat limited	
		Slope	0.50	Too steep for surface application	0.68
		Slow water movement	0.32		
Veal	30	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.68
		Slope	0.50		
MVE:					
Mobeetie	45	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.32	Too steep for sprinkler irrigation	1.00

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
Veal	25	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	1.00
Potter	15	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	1.00
				Slow water movement	0.99
PcB:					
Pep	80	Very limited		Not limited	
		Slow water movement	1.00		
PcC:					
Pep	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.08
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Slow water movement	0.99
				Too steep for sprinkler irrigation	0.22
PMG:					
Potter	45	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	1.00	Too steep for sprinkler irrigation	1.00
				Slow water movement	0.99

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
Mobeetie------------	40	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.32	Too steep for sprinkler irrigation	1.00
PnC:					
Plemons-------------	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.94
				Too steep for surface application	0.08
PuA:					
Pullman-------------	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.99
PuB:					
Pullman-------------	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.99
PxA:					
Pantex--------------	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.99
RaA:					
Randall-------------	80	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slow water movement	1.00
TeB:					
Texroy--------------	80	Very limited		Not limited	
		Slow water movement	1.00		
TSD:					
Tivoli--------------	50	Somewhat limited		Very limited	
		Slope	0.50	Filtering capacity	0.99
				Too steep for surface application	0.68
Springer------------	35	Very limited		Very limited	
		Slow water movement	1.00	Filtering capacity	0.99

Table 8.--Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment--Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W:					
Water----------------	100	Not rated		Not rated	
ZcA:					
Zita-----------------	80	Very limited		Not limited	
		Slow water movement	1.00		

Table 9.--Large Animal Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
AdB:							
Ady------------------	85	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.01	Cutbanks cave	0.01
AdC:							
Ady------------------	85	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.01	Cutbanks cave	0.01
AtA:							
Alibates------------	85	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.01	Cutbanks cave	0.01
AtB:							
Alibates------------	85	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.01	Cutbanks cave	0.01
BcA:							
Bippus--------------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01
BP:							
Pits, borrow--------	95	Not rated		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				Slope	1.00	Slope	1.00
				Cutbanks cave	0.09	Cutbanks cave	0.09
BQG:							
Burson--------------	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Adsorption	0.25	Adsorption	0.25
				Cutbanks cave	0.01	Cutbanks cave	0.01
Quinlan-------------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Adsorption	0.25	Adsorption	0.25
				Cutbanks cave	0.01	Cutbanks cave	0.01
Rock outcrop--------	20	Not rated		Not rated		Not rated	
EcA:							
Estacado------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.08	Clay content	0.08
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.--Large Animal Disposal--Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
EcB:							
Estacado	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.08	Clay content	0.08
				Cutbanks cave	0.01	Cutbanks cave	0.01
GUA:							
Guadalupe	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Seepage	0.50	Seepage	0.50
		Too Sandy	0.50	Sand content	0.47	Sand content	0.47
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01
LcA:							
Lazbuddie	85	Somewhat limited		Very limited		Very limited	
		Too clayey	0.85	Ponding	1.00	Ponding	1.00
		Water gathering	0.10	Clay content	0.50	Clay content	0.50
				Cutbanks cave	0.12	Cutbanks cave	0.12
				Water gathering	0.10	Water gathering	0.10
LkD:							
Likes	80	Somewhat limited		Very limited		Very limited	
		Too Sandy	0.75	Too sandy	0.99	Too sandy	0.99
		Water gathering	0.10	Cutbanks cave	0.12	Cutbanks cave	0.12
				Water gathering	0.10	Water gathering	0.10
LNA:							
Lincoln, frequently flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too Sandy	0.75	Too sandy	1.00	Too sandy	1.00
		Water gathering	0.20	Cutbanks cave	0.48	Cutbanks cave	0.48
				Water gathering	0.20	Water gathering	0.20
LoA:							
Lofton	85	Somewhat limited		Very limited		Very limited	
		Too clayey	0.85	Ponding	1.00	Ponding	1.00
		Water gathering	0.10	Clay content	0.44	Clay content	0.44
				Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
LrC:							
Laverne	80	Not limited		Somewhat limited		Somewhat limited	
				Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
				Cutbanks cave	0.01	Cutbanks cave	0.01
LyA:							
Lockney	85	Somewhat limited		Very limited		Very limited	
		Too clayey	0.85	Ponding	1.00	Ponding	1.00
		Water gathering	0.10	Cutbanks cave	1.00	Cutbanks cave	1.00
				Clay content	0.50	Clay content	0.50
				Water gathering	0.10	Water gathering	0.10

Table 9.--Large Animal Disposal--Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean---------------	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.85	Cutbanks cave	1.00	Cutbanks cave	1.00
		Water gathering	0.30	Clay content	0.50	Clay content	0.50
				Water gathering	0.30	Water gathering	0.30
MnB:							
Manson---------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.78	Water gathering	0.10	Water gathering	0.10
		Water gathering	0.10	Cutbanks cave	0.01	Cutbanks cave	0.01
				Clay content	0.01	Clay content	0.01
MoC:							
Mobeetie-------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
MPD:							
Manson---------------	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.78	Cutbanks cave	0.01	Cutbanks cave	0.01
				Clay content	0.01	Clay content	0.01
Paloduro-------------	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.08	Clay content	0.08
				Cutbanks cave	0.01	Cutbanks cave	0.01
MPE:							
Manson---------------	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.78	Slope	0.04	Cutbanks cave	0.01
				Cutbanks cave	0.01	Clay content	0.01
				Clay content	0.01		
Paloduro-------------	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Slope	0.37	Water gathering	0.10
				Water gathering	0.10	Clay content	0.08
				Clay content	0.08	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
Potter---------------	10	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.03	Slope	0.37	Water gathering	0.03
				Water gathering	0.03	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
MTE:							
Mobeetie-------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.--Large Animal Disposal--Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
Tascosa	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.16	Slope	0.84	Slope	0.16
				Cutbanks cave	0.01	Cutbanks cave	0.01
MVD:							
Mobeetie	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Slope	0.04	Cutbanks cave	0.01
				Cutbanks cave	0.01		
Veal	30	Not limited		Somewhat limited		Somewhat limited	
				Slope	0.04	Cutbanks cave	0.01
				Cutbanks cave	0.01		
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
Potter	15	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Slope	1.00	Slope	0.63
		Water gathering	0.03	Water gathering	0.03	Water gathering	0.03
				Cutbanks cave	0.01	Cutbanks cave	0.01
PcB:							
Pep	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.05	Clay content	0.05
				Cutbanks cave	0.01	Cutbanks cave	0.01
PcC:							
Pep	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Clay content	0.05	Clay content	0.05
				Cutbanks cave	0.01	Cutbanks cave	0.01
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.03	Slope	0.37	Water gathering	0.03
				Water gathering	0.03	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Water gathering	0.03	Water gathering	0.03	Water gathering	0.03
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.--Large Animal Disposal--Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench		Catastrophic Mortality, Large Animal Disposal, \Pit		Catastrophic Mortality, Large Animal Disposal, \Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Mobeetie------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01
PnC:							
Plemons-------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Clayey	0.15	Clay content	0.11	Clay content	0.11
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PuA:							
Pullman-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Clay content	0.27	Clay content	0.27
				Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PuB:							
Pullman-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Clay content	0.26	Clay content	0.26
				Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PxA:							
Pantex--------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Cutbanks cave	0.75	Cutbanks cave	0.75
				Clay content	0.41	Clay content	0.41
				Water gathering	0.10	Water gathering	0.10
RaA:							
Randall-------------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Wetness	1.00	Wetness	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Wetness	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	0.85	Cutbanks cave	1.00	Cutbanks cave	1.00
		Water gathering	0.50	Water gathering	0.50	Water gathering	0.50
TeB:							
Texroy--------------	80	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Seepage	0.50	Seepage	0.50
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
TSD:							
Tivoli--------------	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too Sandy	0.75	Too sandy	1.00	Too sandy	1.00
				Cutbanks cave	1.00	Cutbanks cave	1.00
				Slope	0.04		
Springer------------	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.--Large Animal Disposal--Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench		Catastrophic Mortality, Large Animal Disposal, \Pit		Catastrophic Mortality, Large Animal Disposal, \Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Clay content	0.08	Clay content	0.08
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 10.--Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
AdB:				
Ady	Sandy Loam 16-24" Pz	2,800	2,100	1,400
AdC:				
Ady	Sandy Loam 16-24" Pz	2,800	2,100	1,400
AtA:				
Alibates	Clay Loam 16-24" Pz	2,500	1,800	1,100
AtB:				
Alibates	Clay Loam 16-24" Pz	2,500	1,800	1,100
BcA:				
Bippus	Draw 16-24" Pz	3,000	2,400	1,800
BP:				
Pits, borrow	---	---	---	---
BQG:				
Burson	Rough Breaks 19-26" Pz	1,100	800	500
Quinlan	Loamy Prairie 19-26" Pz	2,800	2,200	1,800
Rock outcrop	---	---	---	---
EcA:				
Estacado	Deep Hardland 16-21" Pz	2,300	1,600	1,000
EcB:				
Estacado	Deep Hardland 16-21" Pz	2,300	1,600	1,000
GUA:				
Guadalupe	Loamy Bottomland 16-24" Pz	2,800	2,200	1,600
LcA:				
Lazbuddie	Deep Hardland 16-21" Pz	2,400	1,200	500
LkD:				
Likes	Sand Hills 16-24" Pz	1,900	1,500	700
LNA:				
Lincoln, frequently flooded	Sandy Bottomland 19-26" Pz	2,500	2,000	1,400
LoA:				
Lofton	Deep Hardland 16-21" Pz	2,000	1,800	1,100
LrC:				
Laverne	Shallow Pe 22-28	1,800	1,400	1,000
LyA:				
Lockney	Deep Hardland 16-21" Pz	1,800	1,500	800
M-W:				
Water, miscellaneous	---	---	---	---
McA:				
McLean	Playa 16-21" Pz	2,800	1,300	600

Table 10.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
MnB:				
Manson	Hardland Slopes 16-24" Pz	2,600	1,900	1,200
MoC:				
Mobeetie	Mixedland Slopes 16-24" Pz	2,500	2,000	1,100
MPD:				
Manson	Hardland Slopes 16-24" Pz	2,600	1,900	1,200
Paloduro	Hardland Slopes 16-24" Pz	2,600	1,900	1,200
MPE:				
Manson	Hardland Slopes 16-24" Pz	2,600	1,900	1,200
Paloduro	Hardland Slopes 16-24" Pz	2,600	1,900	1,200
Potter	Very Shallow 16-24" Pz	1,000	800	500
MTE:				
Mobeetie	Mixedland Slopes 16-24" Pz	2,500	2,000	1,100
Tascosa	Gravelly 16-24" Pz	1,200	900	600
MVD:				
Mobeetie	Mixedland Slopes 16-24" Pz	2,500	2,000	1,100
Veal	Limy Upland 16-24" Pz	2,100	1,600	1,000
MVE:				
Mobeetie	Mixedland Slopes 16-24" Pz	2,500	1,900	1,100
Veal	Limy Upland 16-24" Pz	2,100	1,600	1,000
Potter	Very Shallow 16-24" Pz	1,000	800	500
PcB:				
Pep	Limy Upland 16-21" Pz	2,000	1,300	800
PcC:				
Pep	Limy Upland 16-21" Pz	2,000	1,300	800
PGE:				
Potter	Very Shallow 16-24" Pz	1,000	800	500
PMG:				
Potter	Very Shallow 16-24" Pz	1,000	800	500
Mobeetie	Mixedland Slopes 16-24" Pz	2,500	2,000	1,100
PnC:				
Plemons	Limy Upland 16-24" Pz	2,500	1,800	1,100
PuA:				
Pullman	Deep Hardland 16-21" Pz	2,300	1,600	900
PuB:				
Pullman	Deep Hardland 16-21" Pz	2,300	1,600	900
PxA:				
Pantex	Deep Hardland 16-21" Pz	2,400	1,700	1,000

Table 10.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
RaA:				
Randall	Playa 16-21" Pz	3,000	1,500	800
TeB:				
Texroy	Clay Loam 16-24" Pz	2,500	1,800	1,100
TSD:				
Tivoli	Sand Hills 19-26" Pz	3,500	2,400	1,700
Springer	Sandy 16-24" Pz	3,200	2,400	1,600
W:				
Water	---	---	---	---
ZcA:				
Zita	Deep Hardland 16-21" Pz	2,200	1,700	1,100

Table 11.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
AdB:					
Ady	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm
AdC:					
Ady	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm
AtA:					
Alibates	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
AtB:					
Alibates	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BcA:					
Bippus	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
BP:					
Pits, borrow	---	---	---	---	---
BQG:					
Burson	---	---	---	---	---
Quinlan	Amur honeysuckle; common lilac; skunkbush sumac	redbud	eastern redcedar; oriental arborvitae; osageorange; Rocky Mountain juniper	---	---
Rock outcrop	---	---	---	---	---
EcA:					
Estacado	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
EcB:					
Estacado	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
GUA: Guadalupe	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm
LcA: Lazbuddie	---	---	---	---	---
LkD: Likes	fourwing saltbush	---	eastern redcedar	Siberian elm	---
LNA: Lincoln, frequently flooded	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm
LoA: Lofton	skunkbush sumac; Nanking cherry; lilac	Rocky Mountain juniper; redbud	eastern redcedar; oriental arborvitae; osageorange	ponderosa pine; bur oak; Siberian elm; hackberry; lacebark elm	---
LrC: Laverne	---	---	---	---	---
LyA: Lockney	---	---	---	---	---
M-W: Water, miscellaneous	---	---	---	---	---
McA: McLean	---	---	---	---	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
MnB:					
Manson	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
MoC:					
Mobeetie	fourwing saltbush	---	eastern redcedar	Siberian elm	---
MPD:					
Manson	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
Paloduro	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
MPE:					
Manson	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Paloduro	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
Potter	---	---	---	---	---
MTE:					
Mobeetie	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Tascosa	---	---	---	---	---
MVD:					
Mobeetie	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Veal	fourwing saltbush	---	eastern redcedar	Siberian elm	---
MVE:					
Mobeetie	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Veal	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Potter	---	---	---	---	---
PcB:					
Pep	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PcC:					
Pep	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PGE:					
Potter	---	---	---	---	---
PMG:					
Potter	---	---	---	---	---
Mobeetie	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PnC:					
Plemons	fourwing saltbush	---	eastern redcedar	Siberian elm	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
PuA:					
Pullman	skunkbush sumac; Nanking cherry; lilac	Rocky Mountain juniper; redbud	eastern redcedar; oriental arborvitae; osageorange	ponderosa pine; bur oak; Siberian elm; hackberry	---
PuB:					
Pullman	skunkbush sumac; Nanking cherry; lilac	Rocky Mountain juniper; redbud	eastern redcedar; oriental arborvitae; osageorange	ponderosa pine; bur oak; Siberian elm; hackberry	---
PxA:					
Pantex	skunkbush sumac; Nanking cherry; lilac	Rocky Mountain juniper; redbud	eastern redcedar; oriental arborvitae; osageorange	ponderosa pine; bur oak; Siberian elm; hackberry	---
RaA:					
Randall	---	---	---	---	---
TeB:					
Texroy	honeysuckle; Nanking cherry; skunkbush sumac	redbud; desert willow	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm
TSD:					
Tivoli	Amur honeysuckle; common lilac; skunkbush sumac	American plum	black locust; eastern redcedar; oriental arborvitae; osageorange; red mulberry	---	---
Springer	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
W:					
Water	---	---	---	---	---
ZcA:					
Zita	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm

Table 12.--Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
AdB:							
Ady	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.14	Too sandy	0.14	Too sandy	0.14
AdC:							
Ady	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.14	Too sandy	0.14	Slope	0.50
						Too sandy	0.14
AtA:							
Alibates	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
AtB:							
Alibates	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
BcA:							
Bippus	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Quinlan	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
EcA:							
Estacado	85	Not limited		Not limited		Not limited	
EcB:							
Estacado	85	Not limited		Not limited		Not limited	
GUA:							
Guadalupe	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00

Table 12.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LcA:							
Lazbuddie	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
LkD:							
Likes	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.88
						Too sandy	0.79
LNA:							
Lincoln, frequently flooded	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Too sandy	0.89	Flooding	1.00
		Too sandy	0.89	Flooding	0.40	Too sandy	0.89
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
LrC:							
Laverne	80	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
						Gravel content	0.32
						Slope	0.12
LyA:							
Lockney	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
MnB:							
Manson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50

Table 12.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MoC:							
Mobeetie	80	Not limited		Not limited		Somewhat limited	
						Slope	0.50
MPD:							
Manson	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
Paloduro	40	Not limited		Not limited		Somewhat limited	
						Slope	0.88
MPE:							
Manson	40	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Dusty	0.50
Paloduro	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
Potter	10	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Dusty	0.50	Dusty	0.50	Slow water movement	0.99
		Slope	0.01	Slope	0.01	Gravel content	0.92
						Dusty	0.50
MTE:							
Mobeetie	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Tascosa	35	Somewhat limited		Somewhat limited		Very limited	
		Gravel content	0.17	Gravel content	0.17	Slope	1.00
		Slope	0.16	Slope	0.16	Gravel content	1.00
MVD:							
Mobeetie	55	Not limited		Not limited		Very limited	
						Slope	1.00
Veal	30	Not limited		Not limited		Very limited	
						Slope	1.00
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 12.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
Potter	15	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Slope	0.63	Slope	0.63	Slow water movement	0.99
		Dusty	0.50	Dusty	0.50	Gravel content	0.92
						Dusty	0.50
PcB:							
Pep	80	Not limited		Not limited		Not limited	
PcC:							
Pep	80	Not limited		Not limited		Somewhat limited	
						Slope	0.50
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Dusty	0.50	Dusty	0.50	Slow water movement	0.99
		Slope	0.01	Slope	0.01	Gravel content	0.92
						Dusty	0.50
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.99	Slow water movement	0.99	Slow water movement	0.99
		Dusty	0.50	Dusty	0.50	Gravel content	0.92
						Dusty	0.50
Mobeetie	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
PnC:							
Plemons	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
PuA:							
Pullman	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.44	Slow water movement	0.44	Slow water movement	0.44
PuB:							
Pullman	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.44	Slow water movement	0.44	Slow water movement	0.44
PxA:							
Pantex	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.44	Slow water movement	0.44	Slow water movement	0.44

Table 12.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
TeB:							
Texroy	80	Not limited		Not limited		Not limited	
TSD:							
Tivoli	50	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	1.00
Springer	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.94	Too sandy	0.94	Too sandy	0.94
						Slope	0.12
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Not limited		Not limited		Not limited	

Table 13.--Paths, Trails, and Golf Course Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:							
Ady	85	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.14	Too sandy	0.14		
AdC:							
Ady	85	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.14	Too sandy	0.14		
AtA:							
Alibates	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
AtB:							
Alibates	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
BcA:							
Bippus	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	0.92			Droughty	1.00
						Slope	1.00
						Gravel content	1.00
						Carbonate content	1.00
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Droughty	1.00
		Water erosion	1.00	Slope	0.78	Slope	1.00
		Dusty	0.50	Dusty	0.50		
Quinlan	30	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Slope	1.00
		Water erosion	1.00	Slope	0.22	Droughty	0.99
Rock outcrop	20	Not rated		Not rated		Not rated	
EcA:							
Estacado	85	Not limited		Not limited		Not limited	
EcB:							
Estacado	85	Not limited		Not limited		Not limited	
GUA:							
Guadalupe	80	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00

Table 13.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
LcA:							
Lazbuddie	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
LkD:							
Likes	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Droughty	0.33
LNA:							
Lincoln, frequently flooded	80	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.89	Too sandy	0.89	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Droughty	0.74
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
LrC:							
Laverne	80	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Carbonate content	1.00
						Droughty	0.99
LyA:							
Lockney	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Too clayey	1.00
		Too clayey	0.50	Too clayey	0.50	Ponding	1.00
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Too clayey	1.00
		Too clayey	0.50	Too clayey	0.50	Ponding	1.00
MnB:							
Manson	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
MoC:							
Mobeetie	80	Not limited		Not limited		Not limited	
MPD:							
Manson	45	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Paloduro	40	Not limited		Not limited		Not limited	
MPE:							
Manson	40	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		

Table 13.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
Paloduro	35	Not limited		Not limited		Somewhat limited	
						Slope	0.01
Potter	10	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
						Droughty	0.89
						Slope	0.01
MTE:							
Mobeetie	50	Not limited		Not limited		Very limited	
						Slope	1.00
Tascosa	35	Not limited		Not limited		Somewhat limited	
						Droughty	0.75
						Large stones content	0.32
						Gravel content	0.17
						Slope	0.16
MVD:							
Mobeetie	55	Not limited		Not limited		Not limited	
Veal	30	Not limited		Not limited		Very limited	
						Carbonate content	1.00
						Droughty	0.27
MVE:							
Mobeetie	45	Not limited		Not limited		Very limited	
						Slope	1.00
Veal	25	Not limited		Not limited		Very limited	
						Slope	1.00
						Carbonate content	1.00
						Droughty	0.27
Potter	15	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
						Droughty	0.89
						Slope	0.63
PcB:							
Pep	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PcC:							
Pep	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
						Droughty	0.89
						Slope	0.01

Table 13.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
PMG:							
Potter	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.50	Dusty	0.50	Slope	1.00
		Dusty	0.50			Carbonate content	1.00
						Droughty	0.89
Mobeetie	40	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.08	Slope	1.00
PnC:							
Plemons	80	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
PuA:							
Pullman	90	Not limited		Not limited		Not limited	
PuB:							
Pullman	90	Not limited		Not limited		Not limited	
PxA:							
Pantex	90	Not limited		Not limited		Not limited	
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Depth to saturated zone	1.00
TeB:							
Texroy	80	Not limited		Not limited		Not limited	
TSD:							
Tivoli	50	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.89
Springer	35	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.94	Too sandy	0.94		
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00

Table 14.--Grain and Seed Crops and Domestic Grasses and Legumes for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover		Domestic grasses and legumes for food and cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:					
Ady	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.01		
AdC:					
Ady	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.01		
AtA:					
Alibates	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AtB:					
Alibates	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
BcA:					
Bippus	80	Somewhat limited		Somewhat limited	
		Flooding	0.50	Flooding	0.50
		Too clayey	0.01	Too clayey	0.01
BP:					
Pits, borrow	95	Not rated		Not rated	
BQG:					
Burson	40	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Bedrock	1.00	Bedrock	1.00
		Too arid	1.00	Too arid	1.00
		Slope	1.00	Slope	1.00
Quinlan	30	Very limited		Very limited	
		Droughty	1.00	Bedrock	1.00
		Bedrock	1.00	Slope	1.00
		Slope	1.00	Droughty	0.99
Rock outcrop	20	Not rated		Not rated	
EcA:					
Estacado	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.01	Too clayey	0.01
EcB:					
Estacado	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.01	Too clayey	0.01

Table 14.--Grain and Seed Crops and Domestic Grasses and Legumes for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
GUA:					
Guadalupe-----------	80	Somewhat limited		Somewhat limited	
		Droughty	0.60	Flooding	0.50
		Flooding	0.50		
LcA:					
Lazbuddie-----------	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Ponding	0.50	Ponding	0.50
		Percs slowly	0.50	Percs slowly	0.50
LkD:					
Likes---------------	80	Very limited		Somewhat limited	
		Droughty	1.00	Too sandy	0.50
		Too sandy	0.50	Too arid	0.50
		Too arid	0.50	Droughty	0.32
LNA:					
Lincoln, frequently flooded------------	80	Very limited		Somewhat limited	
		Droughty	1.00	Droughty	0.73
		Flooding	0.50	Too sandy	0.50
		Too sandy	0.50	Flooding	0.50
LoA:					
Lofton--------------	85	Very limited		Very limited	
		Percs slowly	1.00	Percs slowly	1.00
		Too clayey	0.70	Too clayey	0.70
		Ponding	0.50	Ponding	0.50
LrC:					
Laverne-------------	80	Very limited		Very limited	
		Droughty	1.00	Percs slowly	1.00
		Percs slowly	1.00	Droughty	0.99
LyA:					
Lockney-------------	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Ponding	0.50	Ponding	0.50
		Percs slowly	0.50	Percs slowly	0.50
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean--------------	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Ponding	0.50	Ponding	0.50
		Percs slowly	0.50	Percs slowly	0.50
MnB:					
Manson--------------	85	Not limited		Not limited	

Table 14.--Grain and Seed Crops and Domestic Grasses and Legumes for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
MoC:					
Mobeetie	80	Somewhat limited		Somewhat limited	
		Droughty	0.91	Too arid	0.50
		Too arid	0.50		
MPD:					
Manson	45	Not limited		Not limited	
Paloduro	40	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.25	Too clayey	0.25
MPE:					
Manson	40	Not limited		Not limited	
Paloduro	35	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.25	Too clayey	0.25
Potter	10	Very limited		Very limited	
		Droughty	1.00	Too arid	1.00
		Too arid	1.00	Percs slowly	0.93
		Percs slowly	0.93	Droughty	0.89
MTE:					
Mobeetie	50	Somewhat limited		Somewhat limited	
		Droughty	0.91	Too arid	0.50
		Too arid	0.50		
Tascosa	35	Very limited		Somewhat limited	
		Droughty	1.00	Too gravelly, cobbly, or stony	0.98
		Too gravelly, cobbly, or stony	0.98	Droughty	0.74
		Too arid	0.50	Too arid	0.50
MVD:					
Mobeetie	55	Somewhat limited		Somewhat limited	
		Droughty	0.91	Too arid	0.50
		Too arid	0.50		
Veal	30	Very limited		Somewhat limited	
		Droughty	1.00	Too arid	0.50
		Too arid	0.50	Droughty	0.25
MVE:					
Mobeetie	45	Somewhat limited		Somewhat limited	
		Droughty	0.91	Too arid	0.50
		Too arid	0.50		

Table 14.--Grain and Seed Crops and Domestic Grasses and Legumes for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
Veal	25	Very limited		Somewhat limited	
		Droughty	1.00	Too arid	0.50
		Too arid	0.50	Droughty	0.25
Potter	15	Very limited		Very limited	
		Droughty	1.00	Too arid	1.00
		Too arid	1.00	Percs slowly	0.93
		Percs slowly	0.93	Droughty	0.89
PcB:					
Pep	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.29	Too clayey	0.12
		Too clayey	0.12		
PcC:					
Pep	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.31	Too clayey	0.12
		Too clayey	0.12		
PGE:					
Potter	85	Very limited		Very limited	
		Droughty	1.00	Too arid	1.00
		Too arid	1.00	Percs slowly	0.93
		Percs slowly	0.93	Droughty	0.89
PMG:					
Potter	45	Very limited		Very limited	
		Droughty	1.00	Too arid	1.00
		Too arid	1.00	Percs slowly	0.93
		Percs slowly	0.93	Droughty	0.89
		Slope	0.22	Slope	0.22
Mobeetie	40	Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96
		Droughty	0.92	Too arid	0.50
		Too arid	0.50		
PnC:					
Plemons	80	Not limited		Not limited	
PuA:					
Pullman	90	Somewhat limited		Somewhat limited	
		Percs slowly	0.93	Percs slowly	0.93
		Too arid	0.50	Too arid	0.50
		Too clayey	0.32	Too clayey	0.32
PuB:					
Pullman	90	Somewhat limited		Somewhat limited	
		Percs slowly	0.93	Percs slowly	0.93
		Too arid	0.50	Too arid	0.50
		Too clayey	0.32	Too clayey	0.32

Table 14.--Grain and Seed Crops and Domestic Grasses and Legumes for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
PxA:					
Pantex	90	Somewhat limited		Somewhat limited	
		Percs slowly	0.93	Percs slowly	0.93
		Too clayey	0.56	Too clayey	0.56
		Too arid	0.50	Too arid	0.50
RaA:					
Randall	80	Very limited		Very limited	
		Wetness	1.00	Wetness	1.00
		Too clayey	1.00	Too clayey	1.00
		Ponding	1.00	Ponding	1.00
		Percs slowly	0.50	Percs slowly	0.50
TeB:					
Texroy	80	Not limited		Not limited	
TSD:					
Tivoli	50	Very limited		Somewhat limited	
		Droughty	1.00	Droughty	0.89
		Too sandy	1.00	Too sandy	0.50
Springer	35	Somewhat limited		Somewhat limited	
		Droughty	0.75	Too sandy	0.50
		Too sandy	0.50		
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.15	Too clayey	0.15
		Droughty	0.01		

Table 15.--Upland Wild Herbaceous Plants and Upland Shrubs and Vines for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants		Upland shrubs and vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:					
Ady	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AdC:					
Ady	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AtA:					
Alibates	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AtB:					
Alibates	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
BcA:					
Bippus	80	Somewhat limited		Somewhat limited	
		Too clayey	0.01	Too clayey	0.01
BP:					
Pits, borrow	95	Not rated		Not rated	
BQG:					
Burson	40	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Too arid	1.00	Bedrock	1.00
				Too arid	1.00
Quinlan	30	Somewhat limited		Very limited	
		Droughty	0.99	Bedrock	1.00
				Droughty	0.99
Rock outcrop	20	Not rated		Not rated	
EcA:					
Estacado	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.01	Too clayey	0.01
EcB:					
Estacado	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.01	Too clayey	0.01
GUA:					
Guadalupe	80	Not limited		Not limited	

Table 15.--Upland Wild Herbaceous Plants and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Value	Upland shrubs and vines: Rating class and limiting features	Value
LcA:					
Lazbuddie-----------	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
LkD:					
Likes---------------	80	Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too arid	0.50
		Too arid	0.50	Droughty	0.32
		Droughty	0.32		
LNA:					
Lincoln, frequently flooded------------	80	Somewhat limited		Somewhat limited	
		Droughty	0.73	Droughty	0.73
		Too sandy	0.50		
LoA:					
Lofton--------------	85	Somewhat limited		Somewhat limited	
		Too clayey	0.70	Too clayey	0.70
LrC:					
Laverne-------------	80	Somewhat limited		Somewhat limited	
		Droughty	0.99	Droughty	0.99
LyA:					
Lockney-------------	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean--------------	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
MnB:					
Manson--------------	85	Not limited		Not limited	
MoC:					
Mobeetie------------	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
MPD:					
Manson--------------	45	Not limited		Not limited	
Paloduro------------	40	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.25	Too clayey	0.25

Table 15.--Upland Wild Herbaceous Plants and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Value	Upland shrubs and vines: Rating class and limiting features	Value
MPE:					
Manson	40	Not limited		Not limited	
Paloduro	35	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.25	Too clayey	0.25
Potter	10	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.89	Droughty	0.89
MTE:					
Mobeetie	50	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
Tascosa	35	Somewhat limited		Somewhat limited	
		Droughty	0.74	Droughty	0.74
		Too arid	0.50	Too arid	0.50
MVD:					
Mobeetie	55	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
Veal	30	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.25	Droughty	0.25
MVE:					
Mobeetie	45	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
Veal	25	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Droughty	0.25	Droughty	0.25
Potter	15	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.89	Droughty	0.89
PcB:					
Pep	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.12	Too clayey	0.12
PcC:					
Pep	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.12	Too clayey	0.12
PGE:					
Potter	85	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.89	Droughty	0.89

Table 15.--Upland Wild Herbaceous Plants and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Value	Upland shrubs and vines: Rating class and limiting features	Value
PMG:					
Potter	45	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.89	Droughty	0.89
Mobeetie	40	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
PnC:					
Plemons	80	Not limited		Not limited	
PuA:					
Pullman	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.32	Too clayey	0.32
PuB:					
Pullman	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.32	Too clayey	0.32
PxA:					
Pantex	90	Somewhat limited		Somewhat limited	
		Too clayey	0.56	Too clayey	0.56
		Too arid	0.50	Too arid	0.50
RaA:					
Randall	80	Very limited		Very limited	
		Wetness	1.00	Too clayey	1.00
		Too clayey	1.00	Wetness	1.00
TeB:					
Texroy	80	Not limited		Not limited	
TSD:					
Tivoli	50	Very limited		Somewhat limited	
		Too sandy	1.00	Droughty	0.89
		Droughty	0.89	Too sandy	0.50
Springer	35	Somewhat limited		Not limited	
		Too sandy	0.50		
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.15	Too clayey	0.15

Table 16.--Freshwater Wetland Plants for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
AdB:			
Ady	85	Very limited	
		Too dry	1.00
AdC:			
Ady	85	Very limited	
		Too dry	1.00
AtA:			
Alibates	85	Very limited	
		Too dry	1.00
AtB:			
Alibates	85	Very limited	
		Too dry	1.00
BcA:			
Bippus	80	Very limited	
		Too dry	1.00
BP:			
Pits, borrow	95	Very limited	
		Too dry	1.00
BQG:			
Burson	40	Very limited	
		Too dry	1.00
Quinlan	30	Very limited	
		Too dry	1.00
Rock outcrop	20	Not rated	

Table 16.--Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
EcA:			
Estacado	85	Very limited	
		Too dry	1.00
EcB:			
Estacado	85	Very limited	
		Too dry	1.00
GUA:			
Guadalupe	80	Very limited	
		Too dry	1.00
LcA:			
Lazbuddie	85	Very limited	
		Too dry	1.00
LkD:			
Likes	80	Very limited	
		Too dry	1.00
LNA:			
Lincoln, frequently flooded	80	Very limited	
		Too dry	1.00
LoA:			
Lofton	85	Very limited	
		Too dry	1.00
LrC:			
Laverne	80	Very limited	
		Too dry	1.00
LyA:			
Lockney	85	Very limited	
		Too dry	1.00
M-W:			
Water, miscellaneous	100	Not rated	

Table 16.--Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
McA:			
McLean	80	Very limited	
		Too dry	1.00
MnB:			
Manson	85	Very limited	
		Too dry	1.00
		Too alkaline	1.00
MoC:			
Mobeetie	80	Very limited	
		Too dry	1.00
MPD:			
Manson	45	Very limited	
		Too dry	1.00
		Too alkaline	1.00
Paloduro	40	Very limited	
		Too dry	1.00
MPE:			
Manson	40	Very limited	
		Too dry	1.00
		Too alkaline	1.00
Paloduro	35	Very limited	
		Too dry	1.00
Potter	10	Very limited	
		Too dry	1.00
		Too alkaline	1.00
MTE:			
Mobeetie	50	Very limited	
		Too dry	1.00
Tascosa	35	Very limited	
		Too dry	1.00

Table 16.--Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
MVD:			
Mobeetie	55	Very limited	
		Too dry	1.00
Veal	30	Very limited	
		Too dry	1.00
MVE:			
Mobeetie	45	Very limited	
		Too dry	1.00
Veal	25	Very limited	
		Too dry	1.00
Potter	15	Very limited	
		Too dry	1.00
		Too alkaline	1.00
PcB:			
Pep	80	Very limited	
		Too dry	1.00
PcC:			
Pep	80	Very limited	
		Too dry	1.00
PGE:			
Potter	85	Very limited	
		Too dry	1.00
		Too alkaline	1.00
PMG:			
Potter	45	Very limited	
		Too dry	1.00
		Too alkaline	1.00
Mobeetie	40	Very limited	
		Too dry	1.00

Table 16.--Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
PnC:			
Plemons	80	Very limited	
		Too dry	1.00
PuA:			
Pullman	90	Very limited	
		Too dry	1.00
		Excess salt	0.22
PuB:			
Pullman	90	Very limited	
		Too dry	1.00
		Excess salt	0.22
PxA:			
Pantex	90	Very limited	
		Too dry	1.00
RaA:			
Randall	80	Not limited	
TeB:			
Texroy	80	Very limited	
		Too dry	1.00
TSD:			
Tivoli	50	Very limited	
		Too dry	1.00
		Too sandy	0.50
Springer	35	Very limited	
		Too dry	1.00
W:			
Water	100	Not rated	
ZcA:			
Zita	80	Very limited	
		Too dry	1.00

Table 17.--Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
AdB:							
Ady	85	Not limited		Not limited		Not limited	
AdC:							
Ady	85	Not limited		Not limited		Not limited	
AtA:							
Alibates	85	Not limited		Not limited		Not limited	
AtB:							
Alibates	85	Not limited		Not limited		Not limited	
BcA:							
Bippus	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Slope	1.00	Depth to soft bedrock	1.00
Quinlan	30	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Slope	1.00	Depth to soft bedrock	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
EcA:							
Estacado	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
EcB:							
Estacado	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
GUA:							
Guadalupe	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
LcA:							
Lazbuddie	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
LkD:							
Likes	80	Not limited		Not limited		Somewhat limited	
						Slope	0.12
LNA:							
Lincoln, frequently flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
LrC:							
Laverne	80	Somewhat limited		Very limited		Somewhat limited	
		Depth to thin cemented pan	0.50	Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
LyA:							
Lockney	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
MnB:							
Manson	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.89	Shrink-swell	0.82	Shrink-swell	0.89
MoC:							
Mobeetie	80	Not limited		Not limited		Not limited	
MPD:							
Manson	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.89	Shrink-swell	0.82	Shrink-swell	0.89
						Slope	0.12
Paloduro	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.73	Shrink-swell	0.18	Shrink-swell	0.73
						Slope	0.12

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
MPE:							
Manson	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.89	Shrink-swell	0.82	Shrink-swell	0.89
						Slope	0.50
Paloduro	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.73	Shrink-swell	0.18	Slope	1.00
		Slope	0.01	Slope	0.01	Shrink-swell	0.73
Potter	10	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
MTE:							
Mobeetie	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Tascosa	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
MVD:							
Mobeetie	55	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Veal	30	Not limited		Not limited		Somewhat limited	
						Slope	0.50
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Potter	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
PcB:							
Pep	80	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.73			Shrink-swell	0.73
PcC:							
Pep	80	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.73			Shrink-swell	0.73
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Mobeetie	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PnC:							
Plemons	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.02	Shrink-swell	0.02	Shrink-swell	0.02
PuA:							
Pullman	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
PuB:							
Pullman	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
PxA:							
Pantex	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
TeB:							
Texroy	80	Not limited		Not limited		Not limited	
TSD:							
Tivoli	50	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Springer	35	Not limited		Not limited		Not limited	
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Not limited		Not limited		Not limited	

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
AdB:							
Ady	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
AdC:							
Ady	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
AtA:							
Alibates	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
AtB:							
Alibates	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
BcA:							
Bippus	80	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Cutbanks cave	0.10		
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Droughty	1.00
						Slope	1.00
						Gravel content	1.00
						Carbonate content	1.00
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
Quinlan	30	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Droughty	0.99
Rock outcrop	20	Not rated		Not rated		Not rated	
EcA:							
Estacado	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.73				

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
EcB:							
Estacado	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.73				
GUA:							
Guadalupe	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	1.00
				Flooding	0.80		
LcA:							
Lazbuddie	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.41		
LkD:							
Likes	80	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.33
LNA:							
Lincoln, frequently flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	1.00
				Flooding	0.80	Droughty	0.74
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Low strength	1.00	Too clayey	0.12		
		Shrink-swell	1.00	Cutbanks cave	0.10		
LrC:							
Laverne	80	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Depth to cemented pan	1.00
				Cutbanks cave	0.10	Carbonate content	1.00
						Droughty	0.99
LyA:							
Lockney	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Too clayey	1.00
		Ponding	1.00	Cutbanks cave	1.00	Ponding	1.00
		Low strength	1.00	Too clayey	1.00		
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Too clayey	1.00
		Ponding	1.00	Cutbanks cave	1.00	Ponding	1.00
		Low strength	1.00	Too clayey	0.99		

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
MnB:							
Manson	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.89				
MoC:							
Mobeetie	80	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
MPD:							
Manson	45	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.89				
Paloduro	40	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.73				
MPE:							
Manson	40	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.89				
Paloduro	35	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.01
		Shrink-swell	0.73	Slope	0.01		
		Slope	0.01				
Potter	10	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Slope	0.01	Droughty	0.89
						Slope	0.01
MTE:							
Mobeetie	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
Tascosa	35	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.16	Cutbanks cave	1.00	Droughty	0.75
				Slope	0.16	Large stones content	0.32
						Gravel content	0.17
						Slope	0.16
MVD:							
Mobeetie	55	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
Veal	30	Not limited		Very limited		Very limited	
				Cutbanks cave	1.00	Carbonate content	1.00
						Droughty	0.27

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Carbonate content	1.00
						Droughty	0.27
Potter	15	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Cutbanks cave	1.00	Carbonate content	1.00
				Slope	0.63	Droughty	0.89
						Slope	0.63
PcB:							
Pep	80	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.73				
PcC:							
Pep	80	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.73				
PGE:							
Potter	85	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Slope	0.01	Droughty	0.89
						Slope	0.01
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Carbonate content	1.00
						Droughty	0.89
Mobeetie	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
PnC:							
Plemons	80	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.02				
PuA:							
Pullman	90	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Low strength	1.00	Too clayey	0.01		
PuB:							
Pullman	90	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Low strength	1.00	Too clayey	0.01		

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PxA:							
Pantex	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00	Too clayey	0.02		
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Too clayey	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Too clayey	1.00		
TeB:							
Texroy	80	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
TSD:							
Tivoli	50	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.89
Springer	35	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00

Table 19.--Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Septic tank absorption fields: Value	Sewage lagoons: Rating class and limiting features	Sewage lagoons: Value
AdB:					
Ady	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AdC:					
Ady	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
AtA:					
Alibates	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AtB:					
Alibates	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
BcA:					
Bippus	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	0.50
BP:					
Pits, borrow	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
BQG:					
Burson	40	Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00
				Slope	1.00
Quinlan	30	Very limited		Very limited	
		Slow water movement	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
Rock outcrop	20	Not rated		Not rated	

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
EcA:					
Estacado	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.94	Seepage	0.50
EcB:					
Estacado	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.94	Seepage	0.50
GUA:					
Guadalupe	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
LcA:					
Lazbuddie	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Seepage	0.01
LkD:					
Likes	80	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.68
LNA:					
Lincoln, frequently flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
LrC:					
Laverne	80	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
				Slope	0.08
LyA:					
Lockney	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean	80	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
MnB:					
Manson	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
MoC:					
Mobeetie	80	Not limited		Very limited	
				Seepage	1.00
				Slope	0.32
MPD:					
Manson	45	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50
Paloduro	40	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50
MPE:					
Manson	40	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.92
				Seepage	0.50
Paloduro	35	Somewhat limited		Very limited	
		Slow water movement	0.50	Slope	1.00
		Slope	0.01	Seepage	0.50
Potter	10	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
MTE:					
Mobeetie	50	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
				Slope	1.00
Tascosa	35	Somewhat limited		Very limited	
		Slope	0.16	Seepage	1.00
				Slope	1.00
				Large stones content	0.15

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
MVD:					
Mobeetie	55	Not limited		Very limited	
				Seepage	1.00
				Slope	0.92
Veal	30	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.92
				Seepage	0.50
MVE:					
Mobeetie	45	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
				Slope	1.00
Veal	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.50	Seepage	0.50
Potter	15	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63	Seepage	0.50
PcB:					
Pep	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.94	Seepage	0.50
PcC:					
Pep	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.94	Seepage	0.50
				Slope	0.32
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
PMG:					
Potter	45	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00	Seepage	0.50
Mobeetie	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
				Seepage	1.00

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
PnC:					
Plemons	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
				Slope	0.32
PuA:					
Pullman	90	Very limited		Not limited	
		Slow water movement	1.00		
PuB:					
Pullman	90	Very limited		Not limited	
		Slow water movement	1.00		
PxA:					
Pantex	90	Very limited		Not limited	
		Slow water movement	1.00		
RaA:					
Randall	80	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
TeB:					
Texroy	80	Very limited		Somewhat limited	
		Seepage, bottom layer	1.00	Seepage	0.50
		Slow water movement	0.50		
TSD:					
Tivoli	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.92
Springer	35	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
				Slope	0.08
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 20.--Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:							
Ady	85	Not limited		Not limited		Not limited	
AdC:							
Ady	85	Not limited		Not limited		Not limited	
AtA:							
Alibates	85	Not limited		Not limited		Not limited	
AtB:							
Alibates	85	Not limited		Not limited		Not limited	
BcA:							
Bippus	80	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
						Carbonate content	1.00
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Quinlan	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Very limited		Not rated	
				Depth to bedrock	1.00		
				Slope	1.00		
EcA:							
Estacado	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
EcB:							
Estacado	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
GUA:							
Guadalupe	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.50
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	0.50
		Too sandy	0.50				

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
LcA:							
Lazbuddie-----------	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
LkD:							
Likes---------------	80	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
LNA:							
Lincoln, frequently flooded------------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00				
LoA:							
Lofton--------------	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
LrC:							
Laverne-------------	80	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	0.50	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	0.10
LyA:							
Lockney-------------	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean--------------	80	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
MnB:							
Manson--------------	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
MoC:							
Mobeetie------------	80	Not limited		Not limited		Somewhat limited	
						Seepage	0.50

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Trench sanitary landfill: Value	Area sanitary landfill: Rating class and limiting features	Area sanitary landfill: Value	Daily cover for landfill: Rating class and limiting features	Daily cover for landfill: Value
MPD:							
Manson	45	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Paloduro	40	Not limited		Not limited		Not limited	
MPE:							
Manson	40	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Paloduro	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Slope	0.01
Potter	10	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Carbonate content	1.00
						Slope	0.01
MTE:							
Mobeetie	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Seepage	0.50
Tascosa	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.16	Slope	0.16	Gravel content	0.67
						Seepage	0.50
						Slope	0.16
MVD:							
Mobeetie	55	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
Veal	30	Not limited		Not limited		Very limited	
						Gravel content	1.00
						Carbonate content	1.00
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Seepage	0.50
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
						Carbonate content	1.00
Potter	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Gravel content	1.00
						Carbonate content	1.00
						Slope	0.63
PcB:							
Pep	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
PcC:							
Pep	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Carbonate content	1.00
						Slope	0.01
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
						Carbonate content	1.00
Mobeetie	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Seepage	0.50
PnC:							
Plemons	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
PuA:							
Pullman	90	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
PuB:							
Pullman	90	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
PxA:							
Pantex	90	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
TeB:							
Texroy	80	Very limited		Not limited		Not limited	
		Seepage, bottom layer	1.00				

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TSD:							
Tivoli	50	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
Springer	35	Not limited		Very limited		Somewhat limited	
				Seepage	1.00	Seepage	0.50
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00

Table 21.--Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
AdB:					
Ady	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.01
AdC:					
Ady	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.01
AtA:					
Alibates	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.08
AtB:					
Alibates	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.08
BcA:					
Bippus	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BP:					
Pits, borrow	95	Fair		Poor	
		Bottom layer	0.03	Bottom layer	0.00
		Thickest layer	0.03	Thickest layer	0.00
BQG:					
Burson	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Quinlan	30	Poor		Not rated	
		Bottom layer	0.00		
		Thickest layer	0.00		
Rock outcrop	20	Not rated		Not rated	
EcA:					
Estacado	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
EcB:					
Estacado	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
GUA:					
Guadalupe	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
LcA:					
Lazbuddie	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LkD:					
Likes	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.06
		Thickest layer	0.00	Bottom layer	0.14
LNA:					
Lincoln, frequently flooded	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.07
		Thickest layer	0.00	Bottom layer	0.16
LoA:					
Lofton	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LrC:					
Laverne	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LyA:					
Lockney	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
M-W:					
Water, miscellaneous	100	Not rated		Not rated	
McA:					
McLean	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MnB:					
Manson	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
MoC:					
Mobeetie	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MPD:					
Manson	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Paloduro	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MPE:					
Manson	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Paloduro	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Potter	10	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
MTE:					
Mobeetie	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Tascosa	35	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.03	Bottom layer	0.03
MVD:					
Mobeetie	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Veal	30	Fair		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.30	Thickest layer	0.00
MVE:					
Mobeetie	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Veal	25	Fair		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.30	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
Potter	15	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
PcB:					
Pep	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PcC:					
Pep	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PGE:					
Potter	85	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
PMG:					
Potter	45	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
Mobeetie	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PnC:					
Plemons	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PuA:					
Pullman	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PuB:					
Pullman	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PxA:					
Pantex	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
RaA:					
Randall	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
TeB:					
Texroy	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
TSD:					
Tivoli	50	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.25
		Thickest layer	0.00	Bottom layer	0.31
Springer	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
W:					
Water	100	Not rated		Not rated	
ZcA:					
Zita	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
AdB:							
Ady	85	Fair		Good		Good	
		Organic matter content low	0.40				
		Carbonate content	0.68				
AdC:							
Ady	85	Fair		Good		Good	
		Organic matter content low	0.40				
		Carbonate content	0.68				
AtA:							
Alibates	85	Poor		Good		Good	
		Too alkaline	0.00				
		Organic matter content low	0.06				
		Water erosion	0.99				
AtB:							
Alibates	85	Poor		Good		Good	
		Too alkaline	0.00				
		Organic matter content low	0.06				
		Water erosion	0.99				
BcA:							
Bippus	80	Fair		Good		Good	
		Organic matter content low	0.88				
BP:							
Pits, borrow	95	Poor		Fair		Poor	
		Carbonate content	0.00	Slope	0.08	Carbonate content	0.00
		Droughty	0.01			Slope	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
						Rock fragments	0.00
BQG:							
Burson	40	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Slope	0.00
		Organic matter content low	0.60				
		Water erosion	0.99				
Quinlan	30	Not rated		Poor		Not rated	
				Slope	0.00		
Rock outcrop	20	Not rated		Not rated		Not rated	

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
EcA:							
Estacado	85	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.61
		Too clayey	0.70	Shrink-swell	0.91		
EcB:							
Estacado	85	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.61
		Too clayey	0.70	Shrink-swell	0.91		
GUA:							
Guadalupe	80	Fair		Good		Good	
		Organic matter content low	0.18				
LcA:							
Lazbuddie	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.00	Shrink-swell	0.02		
LkD:							
Likes	80	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.02
		Too sandy	0.02				
		Organic matter content low	0.18				
LNA:							
Lincoln, frequently flooded	80	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.12				
		Droughty	0.86				
LoA:							
Lofton	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.32	Shrink-swell	0.24		
		Water erosion	0.99				
LrC:							
Laverne	80	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Carbonate content	0.00			Rock fragments	0.82
		Depth to cemented pan	0.00			Carbonate content	0.99
LyA:							
Lockney	85	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.32	Low strength	0.00		
		Carbonate content	0.92				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.82	Low strength	0.00		
MnB:							
Manson	85	Fair		Poor		Fair	
		Too clayey	0.19	Low strength	0.00	Too clayey	0.14
		Carbonate content	0.26	Shrink-swell	0.73	Carbonate content	0.97
		Organic matter content low	0.37				
		Water erosion	0.99				
MoC:							
Mobeetie	80	Fair		Good		Good	
		Organic matter content low	0.18				
MPD:							
Manson	45	Fair		Poor		Fair	
		Too clayey	0.19	Low strength	0.00	Too clayey	0.14
		Carbonate content	0.26	Shrink-swell	0.73	Carbonate content	0.97
		Organic matter content low	0.37				
		Water erosion	0.99				
Paloduro	40	Fair		Poor		Fair	
		Organic matter content low	0.50	Low strength	0.00	Too clayey	0.72
		Too clayey	0.93	Shrink-swell	0.90		
		Carbonate content	0.99				
MPE:							
Manson	40	Fair		Poor		Fair	
		Too clayey	0.19	Low strength	0.00	Too clayey	0.14
		Carbonate content	0.26	Shrink-swell	0.73	Carbonate content	0.97
		Organic matter content low	0.37				
		Water erosion	0.99				
Paloduro	35	Fair		Poor		Fair	
		Organic matter content low	0.50	Low strength	0.00	Too clayey	0.72
		Too clayey	0.93	Shrink-swell	0.90		
		Carbonate content	0.99				
Potter	10	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Carbonate content	0.00

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
MTE:							
Mobeetie	50	Fair		Good		Poor	
		Organic matter content low	0.18			Slope	0.00
Tascosa	35	Fair		Fair		Poor	
		Carbonate content	0.01	Cobble content	0.67	Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.67			Slope	0.84
MVD:							
Mobeetie	55	Fair		Good		Good	
		Organic matter content low	0.18				
Veal	30	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.18			Carbonate content	0.00
						Hard to reclaim (rock fragments)	0.46
MVE:							
Mobeetie	45	Fair		Good		Poor	
		Organic matter content low	0.18			Slope	0.00
Veal	25	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.18			Slope	0.00
						Carbonate content	0.00
						Hard to reclaim (rock fragments)	0.46
Potter	15	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Carbonate content	0.00
						Slope	0.37
PcB:							
Pep	80	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.36
		Organic matter content low	0.02	No shrink-swell limitation	0.99		
		Too clayey	0.58				
PcC:							
Pep	80	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.36
		Organic matter content low	0.02	No shrink-swell limitation	0.99		
		Too clayey	0.58				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
PGE:							
Potter	85	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Carbonate content	0.00
PMG:							
Potter	45	Poor		Fair		Poor	
		Carbonate content	0.00	Slope	0.50	Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Carbonate content	0.00
						Slope	0.00
Mobeetie	40	Fair		Poor		Poor	
		Organic matter content low	0.18	Slope	0.00	Slope	0.00
PnC:							
Plemons	80	Fair		Poor		Fair	
		Carbonate content	0.32	Low strength	0.00	Carbonate content	0.58
		Organic matter content low	0.98	Shrink-swell	0.97	Too clayey	0.75
		Too clayey	0.99				
		Water erosion	0.99				
PuA:							
Pullman	90	Fair		Poor		Fair	
		Too clayey	0.02	Low strength	0.00	Too clayey	0.02
		Carbonate content	0.08	Shrink-swell	0.48		
		Water erosion	0.99				
PuB:							
Pullman	90	Fair		Poor		Fair	
		Too clayey	0.02	Low strength	0.00	Too clayey	0.02
		Carbonate content	0.08	Shrink-swell	0.50		
		Water erosion	0.99				
PxA:							
Pantex	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.00	Shrink-swell	0.03		
		Organic matter content low	0.50				
		Water erosion	0.99				
RaA:							
Randall	80	Poor		Poor		Poor	
		Too clayey	0.00	Wetness depth	0.00	Too clayey	0.00
		Organic matter content low	0.83	Shrink-swell	0.00	Wetness depth	0.00
				Low strength	0.00		
TeB:							
Texroy	80	Fair		Poor		Good	
		Carbonate content	0.99	Low strength	0.00		

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
TSD:							
Tivoli	50	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.12				
		Droughty	0.75				
Springer	35	Poor		Good		Good	
		Wind erosion	0.00				
		Organic matter content low	0.18				
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.98
		Organic matter content low	0.08				
		Too clayey	0.99				

Table 23.--Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:							
Ady	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Seepage	0.01	Depth to water	1.00
AdC:							
Ady	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Seepage	0.01	Depth to water	1.00
		Slope	0.08				
AtA:							
Alibates	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.96	Depth to water	1.00
				Seepage	0.08		
AtB:							
Alibates	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.96	Depth to water	1.00
				Seepage	0.08		
BcA:							
Bippus	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.57	Depth to water	1.00
BP:							
Pits, borrow	95	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
				Seepage	0.03		
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	0.94	Piping	0.98		
Quinlan	30	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Depth to bedrock	0.74				
		Seepage	0.03				
Rock outcrop	20	Very limited		Not rated		Not rated	
		Slope	1.00				
		Depth to bedrock	1.00				
EcA:							
Estacado	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
EcB:							
Estacado	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GUA:							
Guadalupe-----------	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.07	Depth to water	1.00
LcA:							
Lazbuddie-----------	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.11	Ponding	1.00	Depth to water	1.00
				Hard to pack	0.28		
LkD:							
Likes---------------	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.14	Depth to water	1.00
		Slope	0.32				
LNA:							
Lincoln, frequently flooded------------	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.16	Depth to water	1.00
LoA:							
Lofton--------------	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Ponding	1.00	Depth to water	1.00
				Hard to pack	0.27		
LrC:							
Laverne-------------	80	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
LyA:							
Lockney-------------	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Ponding	1.00	Depth to water	1.00
				Hard to pack	1.00		
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	
McA:							
McLean--------------	80	Not limited		Very limited		Very limited	
				Ponding	1.00	Depth to water	1.00
				Hard to pack	1.00		
MnB:							
Manson--------------	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
MoC:							
Mobeetie------------	80	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	0.08				
MPD:							
Manson--------------	45	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.32				

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Paloduro	40	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.32				
MPE:							
Manson	40	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.68				
Paloduro	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.70				
Potter	10	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
MTE:							
Mobeetie	50	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				
Tascosa	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.03	Depth to water	1.00
		Slope	1.00				
MVD:							
Mobeetie	55	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	0.68				
Veal	30	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Seepage	0.30	Depth to water	1.00
		Slope	0.68				
MVE:							
Mobeetie	45	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				
Veal	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.30	Depth to water	1.00
		Seepage	0.70				
Potter	15	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
PcB:							
Pep	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	Depth to water	1.00
PcC:							
Pep	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	Depth to water	1.00
		Slope	0.08				

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PGE:							
Potter	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
PMG:							
Potter	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
Mobeetie	40	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				
PnC:							
Plemons	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	Depth to water	1.00
		Slope	0.08				
PuA:							
Pullman	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.03			Depth to water	1.00
PuB:							
Pullman	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.03			Depth to water	1.00
PxA:							
Pantex	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.03	Hard to pack	0.23	Depth to water	1.00
RaA:							
Randall	80	Not limited		Very limited		Very limited	
				Ponding	1.00	Slow refill	1.00
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	1.00		
TeB:							
Texroy	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.77	Depth to water	1.00
TSD:							
Tivoli	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.31	Depth to water	1.00
		Slope	0.68				
Springer	35	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00

Table 24.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AdB:							
Ady	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
AdC:							
Ady	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.37	K factor	0.88		
				Slope	0.37		
AtA:							
Alibates	85	Not limited		Very limited		Not limited	
				K factor	1.00		
AtB:							
Alibates	85	Somewhat limited		Very limited		Not limited	
		Slope	0.04	K factor	1.00		
				Slope	0.04		
BcA:							
Bippus	80	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.88	Occasional flooding	0.40
BP:							
Pits, borrow	95	Very limited		Very limited		Not rated	
		Slope	1.00	Ponding	1.00		
				Slope	1.00		
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Slope	1.00	K factor	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	1.00		
Quinlan	30	Very limited		Very limited		Very limited	
		Slope	1.00	K factor	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	1.00		
Rock outcrop	20	Not rated		Not rated		Not rated	

Table 24.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
EcA:							
Estacado	85	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
EcB:							
Estacado	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
GUA:							
Guadalupe	80	Not limited		Somewhat limited		Very limited	
				K factor	0.50	Expect caving	1.00
						Frequent or very frequent flooding	0.70
LcA:							
Lazbuddie	85	Not limited		Somewhat limited		Very limited	
				K factor	0.88	Ponding	1.00
						Expect caving	1.00
						Too clayey	0.41
LkD:							
Likes	80	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Too Sandy	1.00	Expect caving	1.00
				Slope	0.63		
LNA:							
Lincoln, frequently flooded	80	Not limited		Very limited		Very limited	
				Too Sandy	1.00	Expect caving	1.00
						Frequent or very frequent flooding	0.70
LoA:							
Lofton	85	Not limited		Very limited		Very limited	
				K factor	1.00	Ponding	1.00
						Too clayey	0.12
LrC:							
Laverne	80	Very limited		Very limited		Very limited	
		Thin cemented pan	1.00	Thin cemented pan	1.00	Thin cemented pan	1.00
		Slope	0.16	Slope	0.16		
LyA:							
Lockney	85	Not limited		Somewhat limited		Very limited	
				K factor	0.88	Ponding	1.00
						Expect caving	1.00
						Too clayey	1.00
M-W:							
Water, miscellaneous	100	Not rated		Not rated		Not rated	

Table 24.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
McA:							
McLean	80	Not limited		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				K factor	0.88	Expect caving	1.00
						Too clayey	0.99
MnB:							
Manson	85	Somewhat limited		Very limited		Not limited	
		Slope	0.04	K factor	1.00		
				Slope	0.04		
MoC:							
Mobeetie	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.37	Slope	0.37		
				K factor	0.12		
MPD:							
Manson	45	Somewhat limited		Very limited		Not limited	
		Slope	0.63	K factor	1.00		
				Slope	0.63		
Paloduro	40	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.63	Slope	0.63		
				K factor	0.50		
MPE:							
Manson	40	Somewhat limited		Very limited		Not limited	
		Slope	0.84	K factor	1.00		
				Slope	0.84		
Paloduro	35	Very limited		Very limited		Not limited	
		Slope	1.00	Slope	1.00		
				K factor	0.50		
Potter	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
MTE:							
Mobeetie	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				K factor	0.12		
Tascosa	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
		Content of large stones	1.00	Content of large stones	1.00	Slope	0.16
MVD:							
Mobeetie	55	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.84	Slope	0.84		
				K factor	0.12		
Veal	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Expect caving	1.00
				K factor	0.12		

Table 24.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MVE:							
Mobeetie	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				K factor	0.12		
Veal	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
				K factor	0.12	Slope	1.00
Potter	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
						Slope	0.63
PcB:							
Pep	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
PcC:							
Pep	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.37	K factor	0.88		
				Slope	0.37		
PGE:							
Potter	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
PMG:							
Potter	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
						Slope	1.00
Mobeetie	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				K factor	0.12		
PnC:							
Plemons	80	Somewhat limited		Very limited		Not limited	
		Slope	0.37	K factor	1.00		
				Slope	0.37		
PuA:							
Pullman	90	Not limited		Very limited		Somewhat limited	
				K factor	1.00	Too clayey	0.01
PuB:							
Pullman	90	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	K factor	1.00	Too clayey	0.01
				Slope	0.04		
PxA:							
Pantex	90	Not limited		Very limited		Somewhat limited	
				K factor	1.00	Too clayey	0.02

Table 24.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
RaA:							
Randall	80	Not limited		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				Depth to saturated zone	1.00	Depth to saturated zone	1.00
				K factor	0.88	Expect caving	1.00
						Too clayey	1.00
TeB:							
Texroy	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
TSD:							
Tivoli	50	Somewhat limited		Very limited		Very limited	
		Slope	0.84	Too Sandy	1.00	Expect caving	1.00
				Slope	0.84		
Springer	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Expect caving	1.00
W:							
Water	100	Not rated		Not rated		Not rated	
ZcA:							
Zita	80	Not limited		Somewhat limited		Not limited	
				K factor	0.88		

Table 25.--Irrigation Systems Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
AdB:							
Ady	85	Not limited		Not limited		Not limited	
AdC:							
Ady	85	Somewhat limited		Not limited		Not limited	
		Slope	0.08				
AtA:							
Alibates	85	Not limited		Not limited		Not limited	
AtB:							
Alibates	85	Not limited		Not limited		Not limited	
BcA:							
Bippus	80	Somewhat limited		Somewhat limited		Not limited	
		Occasional flooding	0.40	Occasional flooding	0.40		
BP:							
Pits, borrow	95	Not rated		Very limited		Not Rated	
				Low water holding capacity	1.00		
				Slopes, sprinkler irrigation	1.00		
				Drains slowly	0.31		
BQG:							
Burson	40	Very limited		Very limited		Very limited	
		Bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Low water holding capacity	1.00		
		Slope	1.00	Slopes, sprinkler irrigation	1.00		
		Slopes, sprinkler irrigation	1.00				
Quinlan	30	Very limited		Very limited		Very limited	
		Bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Slopes, sprinkler irrigation	1.00		
		Slope	1.00	Low water holding capacity	0.99		
		Slopes, sprinkler irrigation	1.00				
		Percs slowly	0.38				
Rock outcrop	20	Not rated		Not Rated		Not Rated	

Table 25.--Irrigation Systems Management--Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
EcA:							
Estacado	85	Not limited		Not limited		Not limited	
EcB:							
Estacado	85	Not limited		Not limited		Not limited	
GUA:							
Guadalupe	80	Somewhat limited		Somewhat limited		Very limited	
		Frequent or very frequent flooding	0.70	Frequent or very frequent flooding	0.70	Flooding	1.00
LcA:							
Lazbuddie	85	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Drains slowly	0.99	Ponding	1.00
		Ponding	1.00	Ponding	0.50	Excess Sodium	0.02
				Surface clay	0.16		
LkD:							
Likes	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.32	Low water holding capacity	0.63		
LNA:							
Lincoln, frequently flooded	80	Somewhat limited		Somewhat limited		Very limited	
		Frequent or very frequent flooding	0.70	Low water holding capacity	0.86	Flooding	1.00
		Droughty	0.16	Frequent or very frequent flooding	0.70		
LoA:							
Lofton	85	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Drains slowly	0.99	Ponding	1.00
		Ponding	1.00	Ponding	0.50		
LrC:							
Laverne	80	Very limited		Very limited		Not limited	
		Percs slowly	1.00	Drains slowly	1.00		
		Droughty	1.00	Low water holding capacity	0.99		
				Calcium carbonate	0.50		
LyA:							
Lockney	85	Very limited		Somewhat limited		Very limited	
		Ponding	1.00	Drains slowly	0.99	Ponding	1.00
		Percs slowly	1.00	Surface clay	0.92		
				Ponding	0.50		
M-W:							
Water, miscellaneous	100	Not rated		Not Rated		Not Rated	

Table 25.--Irrigation Systems Management--Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
McA:							
McLean	80	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Surface clay	0.99	Ponding	1.00
		Ponding	1.00	Drains slowly	0.99		
				Ponding	0.50		
MnB:							
Manson	85	Somewhat limited		Not limited		Somewhat limited	
		Excess Sodium	0.02			Excess Sodium	0.22
MoC:							
Mobeetie	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.08	Low water holding capacity	0.04		
MPD:							
Manson	45	Somewhat limited		Not limited		Somewhat limited	
		Slope	0.32			Excess Sodium	0.22
		Excess Sodium	0.02				
Paloduro	40	Somewhat limited		Not limited		Not limited	
		Slope	0.32				
MPE:							
Manson	40	Somewhat limited		Not limited		Somewhat limited	
		Slope	0.68			Excess Sodium	0.22
		Excess Sodium	0.02				
Paloduro	35	Very limited		Somewhat limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	0.10		
		Slopes, sprinkler irrigation	0.10				
Potter	10	Very limited		Somewhat limited		Not limited	
		Percs slowly	1.00	Low water holding capacity	0.94		
		Slope	1.00	Drains slowly	0.73		
		Droughty	0.79	Calcium carbonate	0.50		
		Slopes, sprinkler irrigation	0.10	Slopes, sprinkler irrigation	0.10		
MTE:							
Mobeetie	50	Very limited		Very limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	1.00		
		Slopes, sprinkler irrigation	1.00	Low water holding capacity	0.04		
Tascosa	35	Very limited		Somewhat limited		Not limited	
		Slope	1.00	Low water holding capacity	0.87		
		Slopes, sprinkler irrigation	0.40	Slopes, sprinkler irrigation	0.40		
		Droughty	0.38				

Table 25.--Irrigation Systems Management--Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
MVD:							
Mobeetie	55	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.68	Low water holding capacity	0.04		
Veal	30	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.68	Low water holding capacity	0.57		
MVE:							
Mobeetie	45	Very limited		Very limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	1.00		
		Slopes, sprinkler irrigation	1.00	Low water holding capacity	0.04		
Veal	25	Very limited		Very limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	1.00		
		Slopes, sprinkler irrigation	1.00	Low water holding capacity	0.57		
Potter	15	Very limited		Somewhat limited		Not limited	
		Percs slowly	1.00	Low water holding capacity	0.94		
		Slope	1.00	Slopes, sprinkler irrigation	0.78		
		Droughty	0.79	Drains slowly	0.73		
		Slopes, sprinkler irrigation	0.78	Calcium carbonate	0.50		
PcB:							
Pep	80	Not limited		Not limited		Not limited	
PcC:							
Pep	80	Somewhat limited		Not limited		Not limited	
		Slope	0.08				
PGE:							
Potter	85	Very limited		Somewhat limited		Not limited	
		Percs slowly	1.00	Low water holding capacity	0.94		
		Slope	1.00	Drains slowly	0.73		
		Droughty	0.79	Calcium carbonate	0.50		
		Slopes, sprinkler irrigation	0.10	Slopes, sprinkler irrigation	0.10		
PMG:							
Potter	45	Very limited		Very limited		Not limited	
		Percs slowly	1.00	Slopes, sprinkler irrigation	1.00		
		Slope	1.00	Low water holding capacity	0.94		
		Slopes, sprinkler irrigation	1.00	Drains slowly	0.73		
		Droughty	0.79	Calcium carbonate	0.50		

Table 25.--Irrigation Systems Management--Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
Mobeetie	40	Very limited		Very limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	1.00		
		Slopes, sprinkler irrigation	1.00	Low water holding capacity	0.04		
PnC:							
Plemons	80	Somewhat limited		Not limited		Not limited	
		Slope	0.08				
PuA:							
Pullman	90	Very limited		Somewhat limited		Somewhat limited	
		Percs slowly	1.00	Drains slowly	0.73	Excess Sodium	0.02
PuB:							
Pullman	90	Very limited		Somewhat limited		Somewhat limited	
		Percs slowly	1.00	Drains slowly	0.73	Excess Sodium	0.02
PxA:							
Pantex	90	Very limited		Somewhat limited		Somewhat limited	
		Percs slowly	1.00	Drains slowly	0.73	Excess Sodium	0.22
		Excess Sodium	0.02				
RaA:							
Randall	80	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Surface clay	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Wetness	1.00
				Drains slowly	0.99		
TeB:							
Texroy	80	Not limited		Not limited		Not limited	
TSD:							
Tivoli	50	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.68	Low water holding capacity	0.94		
		Droughty	0.28				
Springer	35	Not limited		Somewhat limited		Not limited	
				Low water holding capacity	0.01		
W:							
Water	100	Not rated		Not Rated		Not Rated	
ZcA:							
Zita	80	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		

Table 26.--Engineering Soil Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
AdB:												
Ady-------------	0-10	Fine sandy loam	SC	A-4	0	0	100	100	86-96	31-41	20-31	4-12
	10-48	Sandy clay loam, clay loam	SC	A-6	0	0	100	100	83-100	40-55	29-44	13-24
	48-65	Sandy clay loam, clay loam	CL	A-6	0	0	100	100	83-98	52-67	29-40	10-18
	65-80	Sandy clay loam, clay loam	CL	A-6	0	0	100	100	84-99	49-64	29-40	12-18
AdC:												
Ady-------------	0-10	Fine sandy loam	SC	A-4	0	0	100	100	86-96	31-41	20-31	4-12
	10-46	Sandy clay loam, clay loam	SC	A-6	0	0	100	100	83-100	40-55	29-44	13-24
	46-63	Sandy clay loam, clay loam	CL	A-6	0	0	100	100	83-98	52-67	29-40	10-18
	63-80	Sandy clay loam, clay loam	CL	A-6	0	0	100	100	84-99	49-64	29-40	12-18
AtA:												
Alibates--------	0-8	Loam	CL-ML, CL	A-6	0	0	100	100	90-100	45-80	24-49	6-25
	8-20	Clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	60-80	29-49	12-25
	20-28	Loam, sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	98-100	90-100	55-75	29-46	12-23
	27-62	Fine sandy loam, loam, sandy clay loam	SC, CL-ML	A-6, A-4	0	0	98-100	98-100	85-99	45-65	21-37	6-17
	62-80	Fine sandy loam, loam, sandy clay loam	SC-SM, ML, CL	A-2-4, A-4	0	0	97-100	97-100	85-99	25-50	18-33	3-10
AtB:												
Alibates--------	0-7	Loam	CL-ML, CL	A-6	0	0	100	100	90-100	45-80	24-49	6-25
	7-19	Clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	60-80	29-49	12-25
	19-27	Loam, sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	98-100	90-100	55-75	29-46	12-23
	27-62	Fine sandy loam, loam, sandy clay loam	SC, CL-ML	A-6, A-4	0	0	98-100	98-100	85-99	45-65	21-37	6-17
	62-80	Fine sandy loam, loam, sandy clay loam	SC-SM, ML, CL	A-2-4, A-4	0	0	97-100	97-100	85-99	25-50	18-33	3-10

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BcA:												
Bippus----------	0-14	Clay loam	CL, SC-SM	A-6	0	0	97-100	95-100	81-100	52-75	27-49	9-24
	14-65	Sandy clay loam, loam, clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	98-100	97-100	91-100	49-66	30-45	13-24
	65-80	Fine sandy loam, sandy clay loam, clay loam, loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	93-100	87-100	83-100	38-69	21-42	5-22
BP:												
Pits, borrow----	0-20	Paragravel	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	40-95	11-91	8-89	4-56	25-44	7-25
	20-80	Paragravel, gravelly fine sandy loam, very gravelly fine sandy loam, very gravelly loam, gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	40-95	11-91	8-89	4-56	25-44	7-25
BQG:												
Burson----------	0-6	Loam	CL	A-4, A-6	0	0	100	100	83-98	59-74	23-39	7-19
	6-40	Bedrock			---	---	---	---	---	---	---	---
Quinlan---------	0-8	Loam	CL	A-4, A-6	0	0	100	100	84-99	58-73	23-39	7-19
	8-13	Loam, fine sandy loam, very fine sandy loam, silt loam	SC-SM, CL-ML, CL	A-4, A-6	0	0	100	100	83-100	58-75	21-39	6-19
	13-64	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Bedrock			---	---	---	---	---	---	---	---
EcA:												
Estacado--------	0-6	Clay loam	CL	A-7-6	0	0	100	98-100	93-100	67-87	35-55	15-28
	6-38	Clay loam, sandy clay loam	CL, CH, SC-SM	A-7-6, A-6	0	0	100	98-100	84-100	62-81	34-53	15-29
	38-50	Clay loam, sandy clay loam	CL, CH, SC-SM	A-7-6, A-6	0	0	90-100	87-100	59-86	45-69	32-51	15-29
	50-80	Clay loam, sandy clay loam	CL, SC-SM	A-7-6, A-6	0	0	88-99	84-98	49-85	39-73	32-59	15-36

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EcB:												
Estacado	0-5	Clay loam	CL	A-7-6	0	0	100	98-100	93-100	67-87	35-55	15-28
	5-37	Clay loam, sandy clay loam	CL, CH, SC-SM	A-7-6, A-6	0	0	100	98-100	84-100	62-81	34-53	15-29
	37-49	Clay loam, sandy clay loam	CL, CH, SC-SM	A-7-6, A-6	0	0	90-100	87-100	59-86	45-69	32-51	15-29
	49-80	Clay loam, sandy clay loam	CL, SC-SM	A-7-6, A-6	0	0	88-99	84-98	49-85	39-73	32-59	15-36
GUA:												
Guadalupe	0-12	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	0	99-100	98-100	83-97	33-47	17-31	2-11
	12-25	Fine sandy loam, sandy clay loam	SM, SC-SM, SC	A-2-4, A-4	0	0	99-100	98-100	81-100	33-53	17-37	2-17
	25-38	Sandy clay loam, fine sandy loam	SM, SC-SM, SC	A-2-4, A-2-6, A-4, A-6	0	0	99-100	98-100	68-90	30-51	17-37	2-17
	38-80	Loamy fine sand, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0	98-100	97-100	88-100	24-38	16-30	2-11
LcA:												
Lazbuddie	0-4	Clay	CH	A-7-6	0	0	100	100	94-100	78-94	53-77	28-44
	4-13	Clay	CH	A-7-6	0	0	100	100	97-100	82-98	56-80	31-45
	13-53	Clay	CH	A-7-6	0	0	100	100	96-100	81-97	56-79	31-45
	53-80	Clay loam, clay	CL	A-6	0	0	100	100	91-100	71-93	40-74	13-41
LkD:												
Likes	0-10	Loamy fine sand	SC-SM	A-2-4	0	0-1	88-100	85-100	76-99	21-35	16-28	2-9
	10-30	Loamy fine sand, fine sand, loamy sand, gravelly loamy sand, gravelly fine sand	SC-SM	A-2-4	0	0-1	76-97	73-97	65-96	18-33	16-27	2-9
	30-80	Fine sand, loamy fine sand, loamy sand, gravelly fine sand, gravelly loamy sand	SP-SM, SM, SC-SM	A-2, A-2-4	0	0-1	76-97	73-97	67-97	11-24	0-24	NP-7
LNA:												
Lincoln, frequently flooded	0-11	Loamy fine sand	SC-SM	A-2-4, A-4	0	0	95-100	81-100	74-100	20-40	16-32	2-13
	11-80	Fine sand, loamy fine sand	SP-SM, SM, SC-SM, SC	A-3, A-2-4, A-4	0	0	95-100	82-100	75-99	12-22	0-23	NP-6

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
LoA:												
Lofton----------	0-9	Clay loam	CL	A-7-6	0	0	100	100	95-100	72-82	42-55	21-28
	9-38	Clay, silty clay	CH	A-7-6	0	0	100	100	95-100	77-87	51-62	29-35
	38-52	Clay, silty clay, clay loam	CH, CL	A-7-6, A-6	0	0	100	94-100	81-100	64-88	40-59	21-33
	52-80	Silty clay, clay, clay loam	CL, CH	A-7-6, A-6	0	0	100	83-96	72-96	65-95	37-53	18-26
LrC:												
Laverne---------	0-10	Gravelly loam	CL-ML, CL	A-4, A-6	0	0	82-100	80-100	77-100	55-85	25-45	9-18
	10-17	Very gravelly loam, gravelly loam, loam, fine sandy loam, gravelly fine sandy loam, very gravelly fine sandy loam	GC-GM, GM, CL-ML, CL	A-2-4, A-4, A-6	0	0-2	50-99	40-99	33-98	23-74	23-37	6-12
	17-26	Cemented material			---	---	---	---	---	---	---	---
LyA:												
Lockney---------	0-9	Clay	CH	A-7-6	0	0	100	100	95-100	88-100	63-83	36-48
	9-17	Clay	CH	A-7-6	0	0	100	100	96-100	90-100	66-85	40-52
	17-67	Clay	CH	A-7-6	0	0	100	100	96-100	90-100	64-83	40-51
	67-80	Clay	CH	A-7-6	0	0	100	100	95-100	91-100	62-79	39-48
M-W:												
Water, miscellaneous--	---	---	---	---	---	---	---	---	---	---	---	---
McA:												
McLean----------	0-7	Clay	CH	A-7-6	0	0	100	100	95-100	90-100	66-83	40-49
	7-37	Clay	CH	A-7-6	0	0	100	100	95-100	89-100	65-81	40-49
	37-59	Clay	CH	A-7-6	0	0	100	100	95-100	90-100	65-81	40-49
	59-80	Clay	CH	A-7-6	0	0	100	100	95-100	90-100	64-79	40-48
MnB:												
Manson----------	0-6	Loam	CL	A-6	0	0	100	99-100	94-100	76-88	33-44	12-16
	6-14	Clay loam, loam	CL	A-7-6, A-6	0	0	100	99-100	88-100	71-88	34-48	13-24
	14-39	Silty clay loam, clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	95-100	95-99	88-99	72-90	31-47	11-22
	39-80	Clay loam, silty clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	90-100	90-99	80-95	63-85	31-46	12-24

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MoC:												
Mobeetie	0-8	Fine sandy loam	SC, SC-SM	A-4	0	0	98-100	97-100	84-95	40-50	21-30	4-11
	8-25	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	82-93	40-50	20-29	5-10
	25-41	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	92-100	90-100	75-92	37-49	20-28	5-9
	41-80	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	83-94	40-50	20-28	5-9
MPD:												
Manson	0-5	Loam	CL	A-6	0	0	100	99-100	94-100	76-88	33-44	12-16
	5-14	Clay loam, loam	CL	A-7-6, A-6	0	0	100	99-100	88-100	71-88	34-48	13-24
	14-39	Silty clay loam, clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	95-100	95-99	88-99	72-90	31-47	11-22
	39-80	Clay loam, silty clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	90-100	90-99	80-95	63-85	31-46	12-24
Paloduro	0-12	Clay loam	CL, ML	A-7-6, A-6	0	0	100	100	85-100	62-79	31-51	12-23
	12-32	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	100	100	85-100	62-79	30-47	12-23
	32-72	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	96-100	92-100	78-100	57-82	30-48	12-25
	72-80	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	92-100	84-100	71-100	51-81	29-47	12-24
MPE:												
Manson	0-5	Loam	CL	A-6	0	0	100	99-100	94-100	76-88	33-44	12-16
	5-14	Clay loam, loam	CL	A-7-6, A-6	0	0	100	99-100	88-100	71-88	34-48	13-24
	14-39	Silty clay loam, clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	95-100	95-99	88-99	72-90	31-47	11-22
	39-80	Clay loam, silty clay loam, sandy clay loam	CL	A-7-6, A-6	0	0	90-100	90-99	80-95	63-85	31-46	12-24
Paloduro	0-11	Clay loam	CL, ML	A-7-6, A-6	0	0	100	100	85-100	62-79	31-51	12-23
	11-31	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	100	100	85-100	62-79	30-47	12-23
	31-72	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	96-100	92-100	78-100	57-82	30-48	12-25
	72-80	Clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0	0	92-100	84-100	71-100	51-81	29-47	12-24

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Potter----------	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25
MTE:												
Mobeetie--------	0-8	Fine sandy loam	SC, SC-SM	A-4	0	0	98-100	97-100	84-95	40-50	21-30	4-11
	8-25	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	82-93	40-50	20-29	5-10
	25-41	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	92-100	90-100	75-92	37-49	20-28	5-9
	41-80	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	83-94	40-50	20-28	5-9

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Tascosa	0-9	Very gravelly fine sandy loam	GC-GM, GM, SC	A-2-4, A-1, A-2	0	8-41	44-85	42-84	31-69	20-47	25-35	6-11
	9-13	Extremely gravelly loam, very gravelly loam, very gravelly fine sandy loam, extremely gravelly fine sandy loam, very gravelly sandy loam, extremely gravelly sandy loam	GW-GC, GC, GC-GM	A-2-4, A-1, A-2	0	15-47	21-68	19-67	16-63	11-45	21-30	6-11
	13-20	Extremely gravelly loam, very gravelly loam, extremely gravelly sandy loam, very gravelly sandy loam, extremely gravelly loamy sand, very gravelly loamy sand	GW-GC, GC, GC-GM	A-2-4, A-1, A-2	0	15-47	21-68	19-67	16-63	11-46	20-29	6-11
	20-80	Very gravelly sandy loam, gravelly sandy loam, very gravelly fine sandy loam, gravelly fine sandy loam, very gravelly loamy sand, gravelly loamy sand	GC-GM, SC	A-2-4, A-1, A-2	0	8-35	38-85	36-84	28-72	14-40	20-29	6-11
MVD:												
Mobeetie	0-8	Fine sandy loam	SC, SC-SM	A-4	0	0	98-100	97-100	84-95	40-50	21-30	4-11
	8-25	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	82-93	40-50	20-29	5-10
	25-41	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	92-100	90-100	75-92	37-49	20-28	5-9
	41-80	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	83-94	40-50	20-28	5-9
Veal	0-3	Fine sandy loam	SC	A-4	0	0	84-100	83-100	77-100	34-52	22-32	6-11
	3-13	Gravelly fine sandy loam, gravelly loam, gravelly sandy clay loam	SC, SC-SM	A-4, A-6	0	0	52-81	50-80	48-80	22-49	22-38	6-15
	13-54	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy clay loam	GC, CL	A-2-4, A-4	0	0	35-82	32-81	32-81	19-57	22-37	6-15
	54-80	Gravelly loam, gravelly fine sandy loam, gravelly sandy clay loam	SC, CL	A-6, A-4	0	0	43-82	41-81	35-81	21-55	22-37	6-15

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MVE:												
Mobeetie	0-8	Fine sandy loam	SC, SC-SM	A-4	0	0	98-100	97-100	84-95	40-50	21-30	4-11
	8-25	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	82-93	40-50	20-29	5-10
	25-41	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	92-100	90-100	75-92	37-49	20-28	5-9
	41-80	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	83-94	40-50	20-28	5-9
Veal	0-3	Fine sandy loam	SC	A-4	0	0	84-100	83-100	77-100	34-52	22-32	6-11
	3-13	Gravelly fine sandy loam, gravelly loam, gravelly sandy clay loam	SC, SC-SM	A-4, A-6	0	0	52-81	50-80	48-80	22-49	22-38	6-15
	13-54	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy clay loam	GC, CL	A-2-4, A-4	0	0	35-82	32-81	32-81	19-57	22-37	6-15
	54-80	Gravelly loam, gravelly fine sandy loam, gravelly sandy clay loam	SC, CL	A-6, A-4	0	0	43-82	41-81	35-81	21-55	22-37	6-15
Potter	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25
PcB:												
Pep	0-9	Clay loam	CL	A-7-6	0	0	100	100	95-100	71-84	38-54	18-26
	9-15	Clay loam, loam, silty clay loam	CL, SC-SM	A-7-6, A-6	0	0	100	100	85-100	59-76	30-46	11-21
	15-30	Clay loam, loam, silty clay loam	CL, SC-SM	A-7-6, A-6	0	0	95-100	93-100	75-100	51-76	29-47	11-23
	30-80	Clay loam, loam, silty clay loam	CL, CL-ML, SC-SM	A-7-6, A-6, A-4	0	0	88-97	84-97	67-97	44-72	26-45	9-19

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PcC:												
Pep	0-8	Clay loam	CL	A-7-6	0	0	100	100	95-100	71-84	38-54	18-26
	8-15	Clay loam, loam, silty clay loam	CL, SC-SM	A-7-6, A-6	0	0	100	100	85-100	59-76	30-46	11-21
	15-30	Clay loam, loam, silty clay loam	CL, SC-SM	A-7-6, A-6	0	0	95-100	93-100	75-100	51-76	29-47	11-23
	30-80	Clay loam, loam, silty clay loam	CL, CL-ML, SC-SM	A-7-6, A-6, A-4	0	0	88-97	84-97	67-97	44-72	26-45	9-19
PGE:												
Potter	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25
PMG:												
Potter	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Mobeetie--------	0-7	Fine sandy loam	SC, SC-SM	A-4	0	0	98-100	97-100	84-95	40-50	21-30	4-11
	7-25	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	82-93	40-50	20-29	5-10
	25-41	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	92-100	90-100	75-92	37-49	20-28	5-9
	41-80	Fine sandy loam, loam	SC-SM, SC	A-4	0	0	98-100	97-100	83-94	40-50	20-28	5-9
PnC:												
Plemons---------	0-6	Loam	CL	A-6	0	0	100	95-100	94-99	72-90	23-44	8-16
	6-47	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	95-100	94-99	76-92	32-48	12-21
	47-76	Clay loam, silty clay loam, sandy clay loam	CL	A-6, A-7-6	0	0	95-100	90-100	90-98	74-92	30-48	13-28
	76-80	Clay, clay loam, silty clay loam	CL, CH	A-6, A-7	0	0	98-100	95-100	94-100	78-95	38-62	19-37
PuA:												
Pullman---------	0-5	Clay loam	CL	A-7-6	0	0	100	100	94-100	78-90	41-57	19-29
	5-33	Silty clay loam, silty clay, clay	CH, CL	A-7-6	0	0	100	100	94-100	83-97	49-64	25-36
	33-52	Clay loam, silty clay loam, clay	CH, CL	A-7-6	0	0	98-100	97-100	95-98	80-95	45-59	25-35
	52-80	Clay, clay loam, silty clay loam	CH, CL	A-7-6	0	0	97-100	97-100	95-98	81-96	41-51	16-24
PuB:												
Pullman---------	0-4	Clay loam	CL	A-7-6	0	0	100	100	94-100	78-90	41-57	19-29
	4-32	Silty clay loam, silty clay, clay	CH, CL	A-7-6	0	0	100	100	94-100	83-97	49-64	25-36
	32-51	Clay loam, silty clay loam, clay	CH, CL	A-7-6	0	0	98-100	97-100	95-98	80-95	45-59	25-35
	51-80	Clay, clay loam, silty clay loam	CH, CL	A-7-6	0	0	97-100	97-100	95-98	81-96	41-51	16-24
PxA:												
Pantex----------	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	96-100	88-97	41-58	19-29
	7-34	Silty clay, clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	95-100	86-100	47-69	25-40
	34-71	Silty clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	94-100	85-100	45-66	25-40
	71-80	Silty clay loam, clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	94-100	84-97	42-57	16-33
RaA:												
Randall---------	0-9	Clay	CH	A-7-6, A-7-5	0	0	100	100	96-100	89-100	68-88	40-52
	9-17	Clay, silty clay	CH	A-7-6	0	0	100	100	96-100	89-100	66-84	40-52
	17-62	Clay	CH	A-7-6	0	0	100	100	97-100	91-100	65-83	40-52
	62-80	Clay	CH	A-7-6	0	0	100	100	97-100	91-100	64-81	40-51

Table 26.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
TeB:												
Texroy----------	0-8	Loam	CL	A-4, A-6	0	0	99-100	98-100	91-100	58-79	28-51	9-24
	8-52	Loam, sandy clay loam, clay loam	CL	A-6, A-7-6	0	0	99-100	98-100	91-100	61-79	29-48	12-24
	52-65	Loam, sandy clay loam, clay loam	CL	A-6, A-7-6	0	0	96-100	92-100	87-100	54-76	28-44	12-22
	65-80	Fine sandy loam, loamy fine sand	SM, SC-SM	A-2-4, A-4	0	0	97-100	95-100	85-100	38-52	19-31	4-12
TSD:												
Tivoli----------	0-7	Fine sand	SM	A-2-4	0	0	100	100	92-99	11-18	0-23	NP-6
	7-80	Fine sand, loamy sand, sand	SM	A-2-4, A-3	0	0	100	100	92-100	10-19	0-22	NP-6
Springer--------	0-16	Loamy fine sand	SM, SC-SM	A-2-4	0	0	98-100	95-100	82-100	18-36	0-30	NP-12
	16-42	Fine sandy loam, sandy loam	SC-SM	A-4	0	0	98-100	95-100	87-97	39-47	23-30	7-12
	42-56	Loamy fine sand, fine sandy loam, fine sand, sandy loam, loamy sand	SM, SC-SM	A-2-4	0	0	98-100	95-100	81-99	20-35	0-27	NP-10
	56-80	Fine sandy loam, sandy clay loam, very fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0	98-100	95-100	78-100	32-63	17-44	2-25
W:												
Water-----------	---	---	---	---	---	---	---	---	---	---	---	---
ZcA:												
Zita------------	0-18	Clay loam	CL	A-7-6	0	0	100	98-100	93-100	69-78	38-51	18-25
	18-24	Clay loam, loam, silty clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	98-100	84-100	59-77	29-48	12-24
	24-35	Clay loam, loam, sandy clay loam	CL, SC-SM	A-6, A-4	0	0	89-96	79-91	60-91	39-74	26-54	9-27
	35-80	Clay loam, loam, sandy clay loam	CL, SC-SM	A-6, A-4	0	0	88-95	76-90	57-90	35-71	26-54	9-27

Table 27.--Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Particle-size			Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
		Sand	Silt	Clay						Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
AdB:														
Ady------------------	0-10	55-80	10-30	8-18	1.30-1.60	2-6	0.12-0.15	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	10-48	25-70	10-40	20-35	1.30-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
	48-65	25-70	10-40	20-35	1.45-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
	65-80	25-70	10-45	20-35	1.45-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
AdC:														
Ady------------------	0-10	55-80	10-30	8-18	1.30-1.60	2-6	0.12-0.15	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	10-46	25-70	10-40	20-35	1.30-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
	46-63	25-70	10-40	20-35	1.45-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
	63-80	25-70	10-45	20-35	1.45-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
AtA:														
Alibates-------------	0-8	25-52	20-35	10-35	1.00-1.40	0.6-2	0.15-0.20	1.0-4.5	1.5-2.5	.28	.28	5	6	48
	8-20	20-65	25-45	18-35	1.35-1.65	0.6-2	0.14-0.20	2.0-5.5	0.5-2.0	.32	.32			
	20-28	20-65	25-45	18-35	1.35-1.65	0.6-2	0.14-0.20	1.5-5.5	0.3-1.0	.37	.37			
	27-62	35-80	20-35	10-28	1.35-1.65	0.6-2	0.11-0.15	1.5-3.0	0.1-0.5	.28	.28			
	62-80	35-85	10-35	8-28	1.35-1.75	0.6-6	0.11-0.15	0.5-2.0	0.1-0.5	.24	.24			
AtB:														
Alibates-------------	0-7	25-52	20-35	10-35	1.00-1.40	0.6-2	0.15-0.20	1.0-4.5	1.5-2.5	.28	.28	5	6	48
	7-19	20-65	25-45	18-35	1.35-1.65	0.6-2	0.14-0.20	2.0-5.5	0.5-2.0	.32	.32			
	19-27	20-65	25-45	18-35	1.35-1.65	0.6-2	0.14-0.20	1.5-5.5	0.3-1.0	.37	.37			
	27-62	35-80	20-35	10-28	1.35-1.65	0.6-2	0.11-0.15	1.5-3.0	0.1-0.5	.28	.28			
	62-80	35-85	10-35	8-28	1.35-1.75	0.6-6	0.11-0.15	0.5-2.0	0.1-0.5	.24	.24			
BcA:														
Bippus---------------	0-14	25-70	10-45	15-35	1.40-1.60	0.6-2	0.15-0.20	0.5-3.0	1.0-3.0	.28	.28	5	6	48
	14-65	25-70	10-45	20-35	1.40-1.65	0.6-2	0.15-0.20	1.0-3.0	0.5-1.0	.32	.32			
	65-80	25-80	10-45	10-35	1.40-1.65	0.6-2	0.12-0.18	1.0-2.0	0.1-0.5	.24	.24			
BP:														
Pits, borrow---------	0-20	30-75	10-40	15-35	1.40-1.65	0.06-2	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32	1	8	0
	20-80	30-75	10-40	15-35	1.40-1.65	0.06-2	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size: Sand	Particle-size: Silt	Particle-size: Clay	Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
BQG:														
Burson	0-6	30-52	25-50	12-27	1.35-1.50	0.6-2	0.10-0.18	0.9-2.9	0.1-1.0	.37	.37	1	3	56
	6-40	---	---	---	---	0.06-0.2	---	---	---	---	---			
Quinlan	0-8	30-52	25-45	12-27	1.30-1.55	0.6-2	0.11-0.18	0.0-2.9	0.5-1.0	.37	.37	2	5	56
	8-13	15-70	30-60	10-27	1.30-1.70	0.6-6	0.11-0.17	0.0-2.9	0.5-1.0	.37	.37			
	13-64	---	---	---	---	0.2-0.6	---	---	---	---	---			
Rock outcrop	0-80	---	---	---	---	0.00-0.06	0.00-0.00	---	---	---	---	--	---	---
EcA:														
Estacado	0-6	25-45	15-45	22-40	1.30-1.60	0.2-2	0.12-0.18	2.9-5.9	1.5-3.0	.32	.32	5	6	48
	6-38	25-65	15-45	22-40	1.35-1.55	0.2-2	0.11-0.18	2.9-5.9	1.0-2.0	.32	.32			
	38-50	25-65	15-45	22-40	1.40-1.60	0.2-2	0.10-0.17	2.9-5.9	0.1-0.7	.32	.32			
	50-80	25-65	15-35	22-50	1.40-1.60	0.6-2	0.10-0.17	1.9-5.9	0.1-0.5	.32	.32			
EcB:														
Estacado	0-5	25-45	15-45	22-40	1.30-1.60	0.2-2	0.12-0.18	2.9-5.9	1.5-3.0	.32	.32	5	6	48
	5-37	25-65	15-45	22-40	1.35-1.55	0.2-2	0.11-0.18	2.9-5.9	1.0-2.0	.32	.32			
	37-49	25-65	15-45	22-40	1.40-1.60	0.2-2	0.10-0.17	2.9-5.9	0.1-0.7	.32	.32			
	49-80	25-65	15-35	22-50	1.40-1.60	0.6-2	0.10-0.17	1.9-5.9	0.1-0.5	.32	.32			
GUA:														
Guadalupe	0-12	50-70	15-35	5-18	1.40-1.55	2-6	0.10-0.14	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	12-25	55-70	15-35	5-25	1.40-1.55	2-6	0.10-0.14	0.0-2.9	0.5-1.0	.28	.28			
	25-38	55-70	15-35	5-25	1.40-1.55	2-6	0.10-0.15	0.0-2.9	0.5-1.0	.28	.28			
	38-80	80-90	1-10	5-18	1.45-1.60	2-6	0.06-0.11	0.0-2.9	0.1-0.5	.17	.17			
LcA:														
Lazbuddie	0-4	2-25	20-40	40-65	1.10-1.35	0.00-0.06	0.12-0.18	7.0-12.0	1.5-2.6	.32	.32	5	7	38
	4-13	2-25	20-40	45-70	1.10-1.35	0.00-0.06	0.12-0.18	8.0-15.0	1.0-2.0	.32	.32			
	13-53	1-25	20-40	45-70	1.10-1.35	0.00-0.06	0.11-0.18	8.0-15.0	0.8-1.5	.32	.32			
	53-80	1-30	20-40	35-75	1.30-1.55	0.2-2	0.11-0.18	2.0-8.0	0.1-0.5	.37	.37			
LkD:														
Likes	0-10	75-90	2-15	5-15	1.50-1.65	6-20	0.07-0.10	0.0-2.9	0.1-1.0	.15	.15	5	2	134
	10-30	75-90	2-15	5-15	1.50-1.70	6-20	0.06-0.10	0.0-2.9	0.1-0.5	.15	.15			
	30-80	85-98	0-10	2-12	1.50-1.70	6-20	0.05-0.10	0.0-1.9	0.1-0.5	.15	.15			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size: Sand	Particle-size: Silt	Particle-size: Clay	Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
LNA:														
Lincoln, frequently flooded	0-11	75-96	5-35	5-20	1.35-1.50	6-20	0.05-0.12	0.0-1.9	0.0-0.5	.17	.17	5	2	134
	11-80	75-96	---	3-10	1.30-1.60	6-20	0.04-0.10	0.0-1.9	0.0-0.5	.17	.17			
LoA:														
Lofton	0-9	15-40	20-50	30-40	1.20-1.40	0.2-0.6	0.14-0.20	2.9-5.9	1.5-3.0	.32	.32	5	6	48
	9-38	15-35	20-50	40-50	1.25-1.45	0.00-0.06	0.12-0.18	5.9-8.9	0.8-1.5	.37	.37			
	38-52	15-35	20-50	30-50	1.30-1.50	0.00-0.06	0.12-0.16	4.9-8.9	0.1-0.8	.37	.37			
	52-80	5-25	30-55	30-50	1.30-1.50	0.2-0.6	0.10-0.13	1.9-3.9	0.1-0.5	.32	.32			
LrC:														
Laverne	0-10	35-50	30-45	15-32	1.20-1.55	0.6-2	0.10-0.18	0.0-2.9	0.5-3.0	.20	.37	1	5	56
	10-17	35-50	30-45	15-32	1.45-1.65	0.6-2	0.08-0.12	0.0-2.9	0.1-1.0	.20	.37			
	17-26	---	---	---	---	0.00-0.01	---	---	---	---	---			
LyA:														
Lockney	0-9	2-20	20-40	50-65	1.20-1.30	0.00-0.2	0.12-0.18	9.0-18.0	1.5-3.0	.32	.32	5	7	38
	9-17	1-20	20-40	55-70	1.17-1.30	0.00-0.2	0.11-0.18	9.0-18.0	0.8-1.5	.32	.32			
	17-67	1-20	20-40	55-70	1.17-1.30	0.00-0.2	0.11-0.18	9.0-18.0	0.1-1.0	.32	.32			
	67-80	1-10	20-40	55-75	1.20-1.40	0.00-0.6	0.10-0.18	6.0-10.0	0.1-0.5	.32	.32			
M-W:														
Water, miscellaneous	---	---	---	---	---	---	---	---	---	---	---	--	---	---
McA:														
McLean	0-7	3-12	20-40	55-65	1.00-1.30	0.00-0.2	0.12-0.18	9.0-20.0	1.0-2.0	.32	.32	5	7	38
	7-37	3-12	20-40	55-65	1.00-1.30	0.00-0.1	0.11-0.18	9.0-20.0	0.5-1.0	.32	.32			
	37-59	3-12	20-40	55-65	1.00-1.30	0.00-0.1	0.11-0.18	9.0-20.0	0.5-1.0	.32	.32			
	59-80	3-12	20-40	55-65	1.00-1.30	0.00-0.1	0.11-0.17	9.0-20.0	0.1-0.5	.32	.32			
MnB:														
Manson	0-6	30-50	35-50	18-27	1.30-1.55	0.6-2	0.15-0.19	3.0-4.0	2.0-4.0	.37	.37	5	4L	86
	6-14	20-50	30-45	20-35	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	1.5-2.5	.32	.32			
	14-39	10-60	20-55	20-40	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	0.5-0.8	.32	.32			
	39-80	10-60	20-45	20-40	1.40-1.70	0.6-2	0.12-0.16	4.0-5.5	0.2-0.5	.32	.32			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size Sand	Silt	Clay	Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
MoC:														
Mobeetie------------	0-8	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.17	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	8-25	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.15	0.0-2.9	0.1-0.5	.24	.24			
	25-41	45-75	15-35	10-18	1.35-1.50	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
	41-80	45-75	15-35	10-18	1.40-1.55	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
MPD:														
Manson--------------	0-5	30-50	35-50	18-27	1.30-1.55	0.6-2	0.15-0.19	3.0-4.0	2.0-4.0	.37	.37	5	4L	86
	5-14	20-50	30-45	20-35	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	1.5-2.5	.32	.32			
	14-39	10-60	20-55	20-40	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	0.5-0.8	.32	.32			
	39-80	10-60	20-45	20-40	1.40-1.70	0.6-2	0.12-0.16	4.0-5.5	0.2-0.5	.32	.32			
Paloduro------------	0-12	25-50	25-40	18-35	1.30-1.45	0.6-2	0.12-0.18	1.9-5.9	1.5-3.0	.28	.28	5	4L	86
	12-32	25-50	25-40	18-35	1.45-1.60	0.6-2	0.12-0.18	1.9-5.9	0.8-1.5	.28	.28			
	32-72	25-50	25-40	20-40	1.45-1.60	0.6-2	0.12-0.16	1.9-4.9	0.1-0.8	.28	.28			
	72-80	25-50	25-40	20-40	1.45-1.60	0.6-2	0.12-0.16	0.5-4.9	0.1-0.5	.28	.28			
MPE:														
Manson--------------	0-5	30-50	35-50	18-27	1.30-1.55	0.6-2	0.15-0.19	3.0-4.0	2.0-4.0	.37	.37	5	4L	86
	5-14	20-50	30-45	20-35	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	1.5-2.5	.32	.32			
	14-39	10-60	20-55	20-40	1.45-1.70	0.6-2	0.14-0.18	4.0-5.5	0.5-0.8	.32	.32			
	39-80	10-60	20-45	20-40	1.40-1.70	0.6-2	0.12-0.16	4.0-5.5	0.2-0.5	.32	.32			
Paloduro------------	0-11	25-50	25-40	18-35	1.30-1.45	0.6-2	0.12-0.18	1.9-5.9	1.5-3.0	.28	.28	5	4L	86
	11-31	25-50	25-40	18-35	1.45-1.60	0.6-2	0.12-0.18	1.9-5.9	0.8-1.5	.28	.28			
	31-72	25-50	25-40	20-40	1.45-1.60	0.6-2	0.12-0.16	1.9-4.9	0.1-0.8	.28	.28			
	72-80	25-50	25-40	20-40	1.45-1.60	0.6-2	0.12-0.16	0.5-4.9	0.1-0.5	.28	.28			
Potter--------------	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.10-0.16	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.10	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
MTE:														
Mobeetie------------	0-8	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.17	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	8-25	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.15	0.0-2.9	0.1-0.5	.24	.24			
	25-41	45-75	15-35	10-18	1.35-1.50	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
	41-80	45-75	15-35	10-18	1.40-1.55	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size: Sand	Particle-size: Silt	Particle-size: Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
Tascosa	0-9	30-80	15-50	10-18	1.40-1.60	0.6-6	0.08-0.12	0.0-2.5	2.0-3.0	.10	.28	4	6	48
	9-13	30-80	15-50	10-18	1.40-1.60	0.6-6	0.05-0.10	0.0-2.5	0.5-1.0	.10	.28			
	13-20	30-85	10-50	8-18	1.40-1.60	0.6-6	0.05-0.10	0.0-2.5	0.1-0.5	.10	.28			
	20-80	55-85	10-30	8-18	1.40-1.60	2-6	0.03-0.08	0.0-2.4	0.1-0.4	.10	.20			
MVD:														
Mobeetie	0-8	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.17	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	8-25	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.15	0.0-2.9	0.1-0.5	.24	.24			
	25-41	45-75	15-35	10-18	1.35-1.50	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
	41-80	45-75	15-35	10-18	1.40-1.55	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
Veal	0-3	55-80	10-28	10-20	1.15-1.50	2-6	0.11-0.15	0.5-2.9	0.5-1.5	.24	.24	3	3	86
	3-13	35-75	15-35	12-30	1.05-1.50	0.6-2	0.08-0.12	1.5-2.9	0.1-1.0	.15	.28			
	13-54	35-75	15-35	12-30	1.15-1.50	0.6-2	0.05-0.09	1.5-2.9	0.1-0.5	.15	.37			
	54-80	35-75	15-35	12-30	1.15-1.50	0.6-2	0.05-0.09	1.5-2.9	0.1-0.5	.15	.37			
MVE:														
Mobeetie	0-8	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.17	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	8-25	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.15	0.0-2.9	0.1-0.5	.24	.24			
	25-41	45-75	15-35	10-18	1.35-1.50	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
	41-80	45-75	15-35	10-18	1.40-1.55	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
Veal	0-3	55-80	10-28	10-20	1.15-1.50	2-6	0.11-0.15	0.5-2.9	0.5-1.5	.24	.24	3	3	86
	3-13	35-75	15-35	12-30	1.05-1.50	0.6-2	0.08-0.12	1.5-2.9	0.1-1.0	.15	.28			
	13-54	35-75	15-35	12-30	1.15-1.50	0.6-2	0.05-0.09	1.5-2.9	0.1-0.5	.15	.37			
	54-80	35-75	15-35	12-30	1.15-1.50	0.6-2	0.05-0.09	1.5-2.9	0.1-0.5	.15	.37			
Potter	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.10-0.16	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.10	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
PcB:														
Pep	0-9	25-45	25-45	27-40	1.30-1.60	0.2-2	0.12-0.18	1.9-5.9	1.0-3.0	.32	.32	4	4L	86
	9-15	20-52	25-60	18-35	1.40-1.70	0.2-2	0.11-0.16	2.9-5.9	0.5-1.5	.32	.32			
	15-30	20-52	25-60	18-40	1.40-1.70	0.2-2	0.10-0.15	2.9-5.9	0.1-0.5	.32	.32			
	30-80	20-52	25-60	18-40	1.40-1.70	0.6-2	0.07-0.12	0.5-5.9	0.1-0.3	.32	.32			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size: Sand	Particle-size: Silt	Particle-size: Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
PcC:														
Pep	0-8	25-45	25-45	27-40	1.30-1.60	0.2-2	0.12-0.18	1.9-5.9	1.0-3.0	.32	.32	4	4L	86
	8-15	20-52	25-60	18-35	1.40-1.70	0.2-2	0.11-0.16	2.9-5.9	0.5-1.5	.32	.32			
	15-30	20-52	25-60	18-40	1.40-1.70	0.2-2	0.10-0.15	2.9-5.9	0.1-0.5	.32	.32			
	30-80	20-52	25-60	18-40	1.40-1.70	0.6-2	0.07-0.12	0.5-5.9	0.1-0.3	.32	.32			
PGE:														
Potter	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.10-0.16	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.10	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
PMG:														
Potter	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.10-0.16	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.10	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
Mobeetie	0-7	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.17	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	7-25	45-75	15-35	10-18	1.35-1.50	2-6	0.10-0.15	0.0-2.9	0.1-0.5	.24	.24			
	25-41	45-75	15-35	10-18	1.35-1.50	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
	41-80	45-75	15-35	10-18	1.40-1.55	2-6	0.09-0.15	0.0-2.9	0.1-0.5	.24	.24			
PnC:														
Plemons	0-6	30-50	35-50	5-26	1.30-1.55	0.6-2	0.14-0.18	2.1-4.0	1.0-2.5	.37	.37	4	4L	86
	6-47	18-70	25-50	20-40	1.20-1.45	0.6-2	0.13-0.16	2.1-4.0	0.5-1.0	.32	.32			
	47-76	18-70	25-50	20-40	1.30-1.55	0.6-2	0.12-0.15	2.5-5.2	0.1-0.6	.32	.32			
	76-80	15-40	25-40	28-55	1.20-1.45	0.06-2	0.10-0.14	3.0-5.5	0.3-0.9	.28	.28			
PuA:														
Pullman	0-5	20-30	25-45	27-40	1.08-1.30	0.2-0.6	0.16-0.20	3.9-7.9	2.0-3.0	.32	.32	5	6	48
	5-33	10-30	25-50	35-50	1.30-1.45	0.01-0.1	0.16-0.20	6.9-9.5	1.5-2.0	.37	.37			
	33-52	10-30	25-50	35-50	1.35-1.55	0.01-0.1	0.15-0.20	4.9-7.9	0.1-0.5	.37	.37			
	52-80	10-30	25-50	35-50	1.15-1.55	0.2-0.6	0.12-0.16	2.9-4.2	0.1-0.5	.28	.28			
PuB:														
Pullman	0-4	20-30	25-45	27-40	1.08-1.30	0.2-0.6	0.16-0.20	3.9-7.9	2.0-3.0	.32	.32	5	6	48
	4-32	10-30	25-50	35-50	1.30-1.45	0.01-0.1	0.16-0.20	6.9-9.5	1.5-2.0	.37	.37			
	32-51	10-30	25-50	35-50	1.35-1.55	0.01-0.1	0.15-0.20	4.9-7.9	0.1-0.5	.37	.37			
	51-80	10-30	25-50	35-50	1.15-1.55	0.2-0.6	0.12-0.16	2.9-4.2	0.1-0.5	.28	.28			

Table 27.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Particle-size Sand	Particle-size Silt	Particle-size Clay	Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
PxA:														
Pantex	0-7	5-20	45-55	27-40	1.25-1.50	0.2-0.6	0.18-0.22	5.0-10.0	1.5-3.0	.37	.37	5	6	48
	7-34	5-20	30-55	35-55	1.25-1.50	0.01-0.1	0.15-0.22	6.0-10.0	1.0-2.0	.32	.32			
	34-71	5-25	30-55	35-55	1.25-1.50	0.01-0.1	0.15-0.22	6.0-10.0	0.1-0.8	.37	.37			
	71-80	5-25	30-55	35-45	1.25-1.50	0.2-0.6	0.12-0.18	6.0-10.0	0.1-0.5	.37	.37			
RaA:														
Randall	0-9	5-25	20-35	55-70	1.15-1.35	0.00-0.2	0.12-0.18	9.0-16.0	2.0-3.5	.32	.32	5	7	38
	9-17	5-25	20-45	55-70	1.15-1.35	0.00-0.1	0.11-0.18	10.0-16.0	0.5-1.5	.32	.32			
	17-62	5-25	25-38	55-70	1.15-1.35	0.00-0.1	0.11-0.18	10.0-16.0	0.2-1.0	.32	.32			
	62-80	5-25	25-38	55-70	1.15-1.35	0.00-0.1	0.11-0.17	9.0-15.0	0.1-0.5	.32	.32			
TeB:														
Texroy	0-8	20-50	30-45	15-35	1.45-1.60	0.6-2	0.12-0.20	0.5-4.9	1.5-3.5	.32	.32	5	5	56
	8-52	20-60	20-45	18-35	1.45-1.60	0.6-2	0.12-0.19	0.5-4.9	0.8-2.0	.32	.32			
	52-65	25-60	20-45	18-35	1.45-1.60	0.6-2	0.10-0.15	0.5-4.9	0.1-0.8	.32	.32			
	65-80	55-85	10-35	8-20	1.35-1.55	2-6	0.10-0.13	0.0-2.9	0.1-0.5	.32	.32			
TSD:														
Tivoli	0-7	80-98	0-15	3-10	1.35-1.50	6-20	0.05-0.09	0.0-1.9	0.2-0.8	.15	.15	5	1	220
	7-80	85-98	0-15	1-10	1.50-1.70	6-20	0.02-0.08	0.0-1.9	0.0-0.5	.15	.15			
Springer	0-16	75-95	0-40	1-18	1.35-1.60	6-20	0.08-0.15	0.0-1.9	0.5-1.0	.17	.17	5	2	134
	16-42	55-75	5-40	12-18	1.40-1.60	2-6	0.10-0.15	0.9-2.9	0.1-0.5	.20	.20			
	42-56	55-95	3-40	1-15	1.45-1.70	2-20	0.08-0.12	0.0-1.9	0.1-0.5	.17	.17			
	56-80	50-80	5-40	5-35	1.45-1.60	0.6-6	0.08-0.15	0.9-2.9	0.1-0.5	.28	.28			
W:														
Water	---	---	---	---	---	---	---	---	---	---	---	--	---	---
ZcA:														
Zita	0-18	15-65	25-45	27-35	1.30-1.60	0.6-2	0.15-0.20	0.5-5.9	1.5-3.0	.32	.32	4	6	48
	18-24	15-50	25-60	18-35	1.35-1.50	0.6-2	0.13-0.18	0.0-5.9	0.8-1.5	.32	.32			
	24-35	15-50	15-60	18-50	1.40-1.55	0.6-2	0.10-0.12	0.0-5.9	0.1-0.5	.32	.32			
	35-80	15-50	15-60	18-50	1.40-1.55	0.6-2	0.10-0.12	0.0-5.9	0.1-0.4	.32	.32			

Table 28.--Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
AdB:							
Ady	0-10	7.1-15	6.6-7.8	0	0	0	0
	10-48	15-26	6.6-7.8	0-2	0	0	0
	48-65	11-16	7.9-8.4	5-40	0	0	0
	65-80	12-16	6.6-8.4	1-8	0	0	0
AdC:							
Ady	0-10	7.1-15	6.6-7.8	0	0	0	0
	10-46	15-26	6.6-7.8	0-2	0	0	0
	46-63	11-16	7.9-8.4	5-40	0	0	0
	63-80	12-16	6.6-8.4	1-8	0	0	0
AtA:							
Alibates	0-8	8.9-22	6.6-7.8	0	0	0	0
	8-20	15-28	6.6-8.4	0	0	0	0
	20-28	9.9-28	6.6-8.4	0-8	0	0	0
	27-62	8.9-24	7.9-9.0	1-20	0	0	0
	62-80	3.9-13	7.9-9.0	5-40	0	0	0
AtB:							
Alibates	0-7	8.9-22	6.6-7.8	0	0	0	0
	7-19	15-28	6.6-8.4	0	0	0	0
	19-27	9.9-28	6.6-8.4	0-8	0	0	0
	27-62	8.9-24	7.9-9.0	1-20	0	0	0
	62-80	3.9-13	7.9-9.0	5-40	0	0	0
BcA:							
Bippus	0-14	13-28	6.6-8.4	0-2	0	0.0-2.0	0
	14-65	16-26	7.9-8.4	0-5	0	0.0-2.0	0
	65-80	7.4-23	7.9-8.4	3-15	0	0.0-2.0	0
BP:							
Pits, borrow	0-20	---	7.9-8.4	20-80	0	0.0-2.0	0
	20-80	---	7.9-8.4	20-80	0	0.0-2.0	0
BQG:							
Burson	0-6	9.6-22	7.9-9.0	0-2	0	0.0-2.0	0
	6-40	---	---	---	---	---	---
Quinlan	0-8	10-22	7.4-8.4	0-10	0	0	0
	8-13	8.6-22	7.4-8.4	0-10	0-2	0	0
	13-64	---	---	---	---	---	---
Rock outcrop	0-80	---	---	---	---	---	---
EcA:							
Estacado	0-6	18-32	7.4-8.4	1-3	0	0.0-2.0	0
	6-38	18-32	7.4-8.4	1-6	0	0.0-2.0	0
	38-50	17-31	7.9-8.4	15-40	0	0.0-2.0	0
	50-80	17-37	7.9-9.0	40-60	0	0.0-2.0	0
EcB:							
Estacado	0-5	18-32	7.4-8.4	1-3	0	0.0-2.0	0
	5-37	18-32	7.4-8.4	1-6	0	0.0-2.0	0
	37-49	16-31	7.9-8.4	15-40	0	0.0-2.0	0
	49-80	16-37	7.9-9.0	40-60	0	0.0-2.0	0

Table 28.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
GUA:							
Guadalupe------------	0-12	2.7-9.1	7.9-8.4	0-5	0	0	0
	12-25	2.7-13	7.9-8.4	0-5	0	0	0
	25-38	2.7-13	7.9-8.4	0-5	0	0	0
	38-80	2.6-9.0	7.9-8.4	0-5	0	0	0
LcA:							
Lazbuddie------------	0-4	29-42	7.4-8.4	2-20	0	0.0-2.0	0-1
	4-13	31-40	7.4-8.4	5-20	0	0.0-2.0	0-2
	13-53	31-40	7.4-8.4	5-20	0-2	0.0-2.0	0-3
	53-80	11-33	7.4-8.4	20-70	0-2	0.0-2.0	0-4
LkD:							
Likes----------------	0-10	3.6-9.8	7.4-8.4	1-8	0	0.0-2.0	0
	10-30	3.6-9.3	7.9-8.4	1-8	0	0.0-2.0	0
	30-80	1.6-8.0	7.9-8.4	1-12	0	0.0-2.0	0
LNA:							
Lincoln, frequently flooded-------------	0-11	3.1-14	7.9-8.4	0-5	0	0.0-2.0	0-1
	11-80	2.0-7.4	7.9-8.4	0-5	0	0.0-2.0	0-1
LoA:							
Lofton---------------	0-9	24-32	6.6-8.4	0	0	0.0-3.0	0
	9-38	31-37	7.4-8.4	0-5	0	0.0-3.0	0
	38-52	21-32	7.9-8.4	5-15	0	0.0-3.0	0
	52-80	18-23	7.9-8.4	15-40	0	0.0-3.0	0
LrC:							
Laverne--------------	0-10	9.4-20	7.9-8.4	3-15	0	0.0-2.0	0
	10-17	5.9-13	7.9-8.4	15-40	0	0.0-2.0	0
	17-26	---	---	55-85	---	0.0-2.0	---
LyA:							
Lockney--------------	0-9	37-47	7.4-8.4	0-2	0	0.0-2.0	0-1
	9-17	39-49	7.4-8.4	0-3	0	0.0-2.0	0-1
	17-67	37-47	7.4-8.4	0-6	0	0.0-2.0	0-1
	67-80	36-42	7.9-9.0	5-40	0	0.0-2.0	0-1
M-W:							
Water, miscellaneous-	---	---	---	---	---	---	---
McA:							
McLean---------------	0-7	36-47	6.1-8.4	0-2	0	0.0-2.0	0
	7-37	36-46	6.6-8.4	0-2	0	0.0-2.0	0-1
	37-59	36-43	6.6-8.4	0-2	0	0.0-2.0	0-2
	59-80	34-39	7.9-8.4	1-12	0	0.0-2.0	0-2
MnB:							
Manson---------------	0-6	15-19	7.4-8.4	2-8	0	0.0-2.0	0
	6-14	15-20	7.9-8.4	5-15	0	0.0-2.0	0
	14-39	12-20	7.9-9.0	15-40	0	0.0-2.0	0-3
	39-80	13-23	7.9-9.0	15-50	0	0.0-2.0	0-5
MoC:							
Mobeetie-------------	0-8	7.0-14	7.9-8.4	1-10	0	0	0
	8-25	7.4-12	7.9-8.4	2-10	0	0	0
	25-41	6.6-10	7.9-8.4	4-15	0	0	0
	41-80	7.4-10	7.9-8.4	4-15	0	0	0

Table 28.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
MPD:							
Manson	0-5	15-19	7.4-8.4	2-8	0	0.0-2.0	0
	5-14	15-20	7.9-8.4	5-15	0	0.0-2.0	0
	14-39	12-20	7.9-9.0	15-40	0	0.0-2.0	0-3
	39-80	13-23	7.9-9.0	15-50	0	0.0-2.0	0-5
Paloduro	0-12	15-26	7.9-8.4	1-5	0	0.0-2.0	0
	12-32	15-24	7.9-8.4	1-8	0	0.0-2.0	0
	32-72	14-25	7.9-8.4	5-14	0	0.0-2.0	0
	72-80	14-23	7.9-8.4	15-30	0	0.0-2.0	0
MPE:							
Manson	0-5	15-19	7.4-8.4	2-8	0	0.0-2.0	0
	5-14	15-20	7.9-8.4	5-15	0	0.0-2.0	0
	14-39	12-20	7.9-9.0	15-40	0	0.0-2.0	0-3
	39-80	13-23	7.9-9.0	15-50	0	0.0-2.0	0-5
Paloduro	0-11	15-26	7.9-8.4	1-5	0	0.0-2.0	0
	11-31	15-24	7.9-8.4	1-8	0	0.0-2.0	0
	31-72	14-25	7.9-8.4	5-14	0	0.0-2.0	0
	72-80	14-23	7.9-8.4	15-30	0	0.0-2.0	0
Potter	0-6	16-34	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	7.9-9.0	40-60	0	0.0-2.0	0
MTE:							
Mobeetie	0-8	7.0-14	7.9-8.4	1-10	0	0	0
	8-25	7.4-12	7.9-8.4	2-10	0	0	0
	25-41	6.6-10	7.9-8.4	4-15	0	0	0
	41-80	7.4-10	7.9-8.4	4-15	0	0	0
Tascosa	0-9	9.1-15	7.4-8.4	2-10	0	0.0-2.0	0
	9-13	8.6-14	7.4-8.4	8-25	0	0.0-2.0	0
	13-20	8.1-13	7.4-8.4	15-50	0	0.0-2.0	0
	20-80	8.1-14	7.4-8.4	10-40	0	0.0-2.0	0
MVD:							
Mobeetie	0-8	7.0-14	7.9-8.4	1-10	0	0	0
	8-25	7.4-12	7.9-8.4	2-10	0	0	0
	25-41	6.6-10	7.9-8.4	4-15	0	0	0
	41-80	7.4-10	7.9-8.4	4-15	0	0	0
Veal	0-3	6.8-13	6.6-8.4	5-15	0	0.0-2.0	0
	3-13	4.1-13	7.9-9.0	15-60	0	0.0-2.0	0
	13-54	4.1-11	7.9-9.0	15-60	0	0.0-2.0	0
	54-80	4.1-13	7.9-9.0	15-60	0	0.0-2.0	0
MVE:							
Mobeetie	0-8	7.0-14	7.9-8.4	1-10	0	0	0
	8-25	7.4-12	7.9-8.4	2-10	0	0	0
	25-41	6.6-10	7.9-8.4	4-15	0	0	0
	41-80	7.4-10	7.9-8.4	4-15	0	0	0
Veal	0-3	6.8-12	6.6-8.4	5-15	0	0.0-2.0	0
	3-13	4.1-13	7.9-9.0	15-60	0	0.0-2.0	0
	13-54	4.1-11	7.9-9.0	15-60	0	0.0-2.0	0
	54-80	4.1-13	7.9-9.0	15-60	0	0.0-2.0	0

Table 28.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
Potter----------------	0-6	16-34	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	7.9-9.0	40-60	0	0.0-2.0	0
PcB:							
Pep-------------------	0-9	21-29	7.4-8.4	3-8	0	0.0-2.0	0
	9-15	14-22	7.4-8.4	5-10	0	0.0-2.0	0
	15-30	13-22	7.9-8.4	10-40	0	0.0-2.0	0
	30-80	10-18	7.9-9.0	40-60	0	0.0-2.0	0
PcC:							
Pep-------------------	0-8	21-29	7.4-8.4	3-8	0	0.0-2.0	0
	8-15	14-22	7.4-8.4	5-10	0	0.0-2.0	0
	15-30	13-22	7.9-8.4	10-40	0	0.0-2.0	0
	30-80	10-18	7.9-9.0	40-60	0	0.0-2.0	0
PGE:							
Potter----------------	0-6	16-34	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	7.9-9.0	40-60	0	0.0-2.0	0
PMG:							
Potter----------------	0-6	16-34	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	7.9-9.0	40-60	0	0.0-2.0	0
Mobeetie-------------	0-7	7.0-14	7.9-8.4	1-10	0	0	0
	7-25	7.4-12	7.9-8.4	2-10	0	0	0
	25-41	6.6-10	7.9-8.4	4-15	0	0	0
	41-80	7.4-10	7.9-8.4	4-15	0	0	0
PnC:							
Plemons--------------	0-6	13-19	7.9-8.4	0-15	0	0.0-2.0	0-1
	6-47	8.7-18	7.9-9.0	15-50	0	0.0-2.0	0-2
	47-76	16-27	7.9-9.0	10-50	0	0.0-2.0	0-4
	76-80	21-37	7.9-8.4	0-15	0	0.0-2.0	0-4
PuA:							
Pullman--------------	0-5	22-32	6.6-8.4	0	0	0.0-3.0	0-2
	5-33	21-39	7.4-8.4	0	0	0.0-2.0	0-4
	33-52	21-35	7.9-8.4	1-10	0	0.0-2.0	0-4
	52-80	11-20	7.9-8.4	15-60	0	0.0-2.0	0-4
PuB:							
Pullman--------------	0-4	22-32	6.6-8.4	0	0	0.0-3.0	0-2
	4-32	21-39	7.4-8.4	0	0	0.0-2.0	0-4
	32-51	21-34	7.9-8.4	1-10	0	0.0-2.0	0-4
	51-80	11-20	7.9-8.4	15-60	0	0.0-2.0	0-4
PxA:							
Pantex---------------	0-7	22-32	6.6-7.8	0-2	0	0.0-2.0	0
	7-34	27-42	7.4-8.4	0-3	0	0.0-2.0	0-2
	34-71	25-40	7.4-8.4	0-5	0	0.0-2.0	0-4
	71-80	13-34	7.9-8.4	15-60	0	0.0-2.0	0-4

Table 28.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
RaA:							
Randall---------------	0-9	32-51	6.1-7.8	0	0	0.0-1.5	0
	9-17	34-49	6.6-7.8	0	0	0.0-1.0	0
	17-62	32-49	6.6-7.8	0	0	0.0-1.0	0
	62-80	33-46	6.6-8.4	0-15	0	0.0-1.0	0
TeB:							
Texroy----------------	0-8	13-27	6.6-8.4	0-2	0	0.0-2.0	0
	8-52	15-27	7.4-8.4	0-3	0	0.0-2.0	0
	52-65	14-23	7.4-8.4	10-25	0	0.0-2.0	0
	65-80	6.6-14	7.4-8.4	0-10	0	0.0-2.0	0
TSD:							
Tivoli----------------	0-7	2.4-7.6	6.1-7.8	0	0	0	0
	7-80	0.8-7.4	6.1-8.4	0	0	0	0
Springer--------------	0-16	0.6-9.7	6.6-7.8	0	0	0.0-2.0	0
	16-42	6.3-9.6	6.6-8.4	0	0	0.0-2.0	0
	42-56	0.5-8.0	6.6-8.4	0-2	0	0.0-2.0	0
	56-80	2.6-18	6.6-8.4	0-2	0	0.0-2.0	0
W:							
Water-----------------	---	---	---	---	---	---	---
ZcA:							
Zita------------------	0-18	22-29	7.4-8.4	0	0	0	0
	18-24	15-27	7.9-8.4	0-5	0	0	0
	24-35	9.6-23	7.9-8.4	30-60	0	0.0-2.0	0
	35-80	9.6-23	7.9-8.4	30-60	0	0.0-2.0	0

Table 29.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
AdB:										
Ady	B	Low	Jan-Dec	---	---	---	---	None	---	None
AdC:										
Ady	B	Low	Jan-Dec	---	---	---	---	None	---	None
AtA:										
Alibates	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
AtB:										
Alibates	B	Low	Jan-Dec	---	---	---	---	None	---	None
BcA:										
Bippus	B	Negligible	Apr-Oct	---	---	---	---	None	Very brief	Occasional
Pits, borrow	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			April	---	---	0.0-0.5	Long	Occasional	---	None
			May-Sep	---	---	0.0-2.0	Long	Occasional	---	None
			October	---	---	0.0-0.5	Long	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None
BQG:										
Burson	D	Very high	Jan-Dec	---	---	---	---	None	---	None
Quinlan	D	Very high	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	---	Very high	Jan-Dec	---	---	---	---	None	---	None
EcA:										
Estacado	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
EcB:										
Estacado	B	Low	Jan-Dec	---	---	---	---	None	---	None
GUA:										
Guadalupe	A	Negligible	Apr-Oct	---	---	---	---	None	Very brief	Frequent

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
LcA:										
Lazbuddie	D	Negligible	Jan-Apr	---	---	---	---	---	---	None
			May-Sept	---	---	0.0-1.0	Very brief	Rare	---	None
			Oct-Dec	---	---	---	---	---	---	None
LkD:										
Likes	A	Low	Jan-Dec	---	---	---	---	None	---	None
LNA:										
Lincoln, frequently flooded	A	Negligible	Apr-Oct	---	---	---	---	None	Very brief	Frequent
LoA:										
Lofton	D	Negligible								
			Jan-Apr	---	---	---	---	---	---	None
			May-Sept	---	---	0.2-1.0	Very brief	Occasional	---	None
			Oct-Dec	---	---	---	---	---	---	None
LrC:										
Laverne	D	Very high	Jan-Dec	---	---	---	---	None	---	None
LyA:										
Lockney	D	Negligible	Jan-Apr	---	---	---	---	---	---	None
			May-Sept	---	---	0.0-1.0	Very brief	Rare	---	None
			Oct-Dec	---	---	---	---	---	---	None
M-W:										
Water, miscellaneous	---	---	Jan-Dec	---	---	---	---	None	---	---
McA:										
McLean	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			April	---	---	0.0-0.6	Brief	Occasional	---	None
			May-Sept	---	---	0.0-1.0	Brief	Occasional	---	None
			October	---	---	0.0-0.6	Brief	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None
MnB:										
Manson	B	Low	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
MoC:										
Mobeetie	A	Very low	Jan-Dec	---	---	---	---	None	---	None
MPD:										
Manson	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Paloduro	B	Medium	Jan-Dec	---	---	---	---	None	---	None
MPE:										
Manson	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Paloduro	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Potter	C	High	Jan-Dec	---	---	---	---	None	---	None
MTE:										
Mobeetie	A	Low	Jan-Dec	---	---	---	---	None	---	None
Tascosa	B	Medium	Jan-Dec	---	---	---	---	None	---	None
MVD:										
Mobeetie	A	Low	Jan-Dec	---	---	---	---	None	---	None
Veal	B	Medium	Jan-Dec	---	---	---	---	None	---	None
MVE:										
Mobeetie	A	Low	Jan-Dec	---	---	---	---	None	---	None
Veal	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Potter	C	High	Jan-Dec	---	---	---	---	None	---	None
PcB:										
Pep	B	Low	Jan-Dec	---	---	---	---	None	---	None
PcC:										
Pep	B	Low	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
PGE:										
Potter	C	High	Jan-Dec	---	---	---	---	None	---	None
PMG:										
Potter	C	Very high	Jan-Dec	---	---	---	---	None	---	None
Mobeetie	A	Medium	Jan-Dec	---	---	---	---	None	---	None
PnC:										
Plemons	B	Low	Jan-Dec	---	---	---	---	None	---	None
PuA:										
Pullman	C	Low	Jan-Dec	---	---	---	---	None	---	None
PuB:										
Pullman	C	Medium	Jan-Dec	---	---	---	---	None	---	None
PxA:										
Pantex	C	Low	Jan-Dec	---	---	---	---	None	---	None
RaA:										
Randall	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			April	1.0-1.5	2.0-3.0	0.0-1.0	Brief	Frequent	---	None
			May-Jun	0.0-0.5	2.0-3.0	0.0-3.0	Long	Frequent	---	None
			Jul-Aug	---	---	0.0-3.0	Long	Frequent	---	None
			September	0.0-0.5	2.0-3.0	0.0-3.0	Long	Frequent	---	None
			October	0.0-0.5	2.0-3.0	0.0-1.0	Brief	Frequent	---	None
			November	1.0-1.5	2.0-3.0	---	---	---	---	None
			December	---	---	---	---	---	---	None
TeB:										
Texroy	B	Low	Jan-Dec	---	---	---	---	None	---	None
TSD:										
Tivoli	A	Low	Jan-Dec	---	---	---	---	None	---	None
Springer	A	Very low	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
W:										
Water	---	---	Jan-Mar	1.0-6.0	>6.0	6.1-6.1	Very long	Frequent	---	None
			Apr-Jun	0.0-1.0	>6.0	6.1-6.1	Very long	Frequent	---	None
			Jul-Aug	1.0-6.0	>6.0	6.1-6.1	Very long	Frequent	---	None
			Sept-Oct	0.0-1.0	>6.0	6.1-6.1	Very long	Frequent	---	None
			Nov-Dec	1.0-6.0	>6.0	6.1-6.1	Very long	Frequent	---	None
ZcA:										
Zita	B	Negligible	Jan-Dec	---	---	---	---	None	---	None

Table 30.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
AdB:						
Ady	---	---	---	---	Low	Low
AdC:						
Ady	---	---	---	---	Low	Low
AtA:						
Alibates	---	---	---	---	Low	Low
AtB:						
Alibates	---	---	---	---	Low	Low
BcA:						
Bippus	---	---	---	---	Moderate	Low
BP:						
Pits, borrow	---	---	---	---	Low	Low
BQG:						
Burson	Paralithic bedrock	---	---	Weakly cemented	Low	Low
Quinlan	Densic bedrock	---	---	Noncemented	Low	Low
Rock outcrop	Lithic bedrock	0-2	78-80	Indurated	---	---
EcA:						
Estacado	---	---	---	---	Low	Low
EcB:						
Estacado	---	---	---	---	Low	Low
GUA:						
Guadalupe	---	---	---	---	Low	Low
LcA:						
Lazbuddie	---	---	---	---	Moderate	Low
LkD:						
Likes	---	---	---	---	Moderate	Low
LNA:						
Lincoln, frequently flooded	---	---	---	---	Low	Low
LoA:						
Lofton	---	---	---	---	Moderate	Low
LrC:						
Laverne	Petrocalcic	---	---	Indurated	Low	Low
LyA:						
Lockney	---	---	---	---	Moderate	Low
M-W:						
Water, miscellaneous	---	---	---	---	---	---

Table 30.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
McA:						
McLean	---	---	---	---	Moderate	Low
MnB:						
Manson	---	---	---	---	Low	Low
MoC:						
Mobeetie	---	---	---	---	Low	Low
MPD:						
Manson	---	---	---	---	Low	Low
Paloduro	---	---	---	---	Low	Low
MPE:						
Manson	---	---	---	---	Low	Low
Paloduro	---	---	---	---	Low	Low
Potter	---	---	---	---	Low	Low
MTE:						
Mobeetie	---	---	---	---	Low	Low
Tascosa	---	---	---	---	Low	Low
MVD:						
Mobeetie	---	---	---	---	Low	Low
Veal	---	---	---	---	Moderate	Low
MVE:						
Mobeetie	---	---	---	---	Low	Low
Veal	---	---	---	---	Moderate	Low
Potter	---	---	---	---	Low	Low
PcB:						
Pep	---	---	---	---	Low	Low
PcC:						
Pep	---	---	---	---	Low	Low
PGE:						
Potter	---	---	---	---	Low	Low
PMG:						
Potter	---	---	---	---	Low	Low
Mobeetie	---	---	---	---	Low	Low
PnC:						
Plemons	---	---	---	---	Low	Low
PuA:						
Pullman	---	---	---	---	Moderate	Low

Table 30.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
PuB:						
Pullman	---	---	---	---	Moderate	Low
PxA:						
Pantex	---	---	---	---	Moderate	Low
RaA:						
Randall	---	---	---	---	High	Low
TeB:						
Texroy	---	---	---	---	Low	Low
TSD:						
Tivoli	---	---	---	---	Low	Low
Springer	---	---	---	---	Moderate	Low
W:						
Water	---	---	---	---	---	---
ZcA:						
Zita	---	---	---	---	Moderate	Low

Table 31.--Physical Analyses of Selected Soils

Soil Name and Sample number	Depth	Horizon	Particle size distribution (percent less than 2 mm): Sand: Very Coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very Fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Inches										cm/cm	g/cc	Pct. (wt)
Alibates[1]													
(S97TX065-002)	0 to 7	A	0.1	0.8	18.3	20.0	12.4	51.6	28.3	20.1	---	---	---
	7 to 18	Bt1	0	0.5	11.1	12.4	11.1	35.1	34.9	30.0	0.041	1.47	20.8
	18 to 27	Bt2	0.1	0.6	13.1	15.8	12.5	42.1	35.5	22.4	0.026	1.37	17.7
	27 to 39	Btk1	0	0.8	15.0	17.6	13.6	47.0	33.6	19.4	0.020	1.44	15.2
	39 to 61	Btk2	0	0.6	18.6	20.5	15.6	55.3	27.8	16.9	0.017	1.57	13.1
	61 to 75	Btk3	0.2	2.0	32.7	26.5	11.4	72.8	16.5	10.7	0.012	1.59	11.5
	75 to 80	Btk4	0	1.0	32.3	31.3	10.9	75.5	14.8	9.7	0.008	1.71	8.0
Lazbuddie[1,3]													
(S06TX369-002)	0 to 3	Ap	0.1	0.2	1.4	8.7	9.6	20.0	34.4	45.6	0.077	1.16	32.3
	3 to 13	Bss1	0	0.2	1.6	7.0	11.3	20.1	31.1	48.8	0.086	1.28	30.6
	13 to 34	Bss2	0	0.2	1.4	7.4	11.1	20.1	30.8	49.1	0.092	1.29	33.3
	34 to 53	Bss3	0	0.1	1.1	7.3	12.0	20.5	30.9	48.6	0.097	1.28	33.4
	53 to 80	Bkk	0.3	1.5	5.1	12.7	6.1	25.7	36.8	37.5	0.027	1.53	21.0
Manson[1]													
(S97TX065-001)	0 to 6	A	0.2	0.4	0.8	6.6	23.2	31.2	45.3	23.5	---	---	---
	6 to 14	Bw	0.1	0.3	0.8	7.3	22.6	31.1	38.0	30.9	---	---	---
	14 to 22	Btk1	0.5	0.4	0.8	5.5	15.7	22.9	40.7	36.4	0.033	1.34	22.9
	22 to 39	Btk2	0.2	0.5	0.9	4.2	11.9	17.7	45.4	36.9	0.053	1.47	23.4
	39 to 46	Btk3	0	0	0.7	5.8	19.7	26.2	39.2	34.6	0.054	1.52	23.7
	46 to 63	Btk4	0.7	0.9	1.3	5.2	14.6	22.7	42.7	34.6	0.049	1.45	24.8
	63 to 76	Btk5	0.6	1.1	1.8	8.4	17.3	29.2	33.4	37.4	0.051	1.42	27.1
	76 to 80	2Btk6	0.8	0.6	1.3	7.4	18.5	28.6	26.7	44.7	0.049	1.46	24.9
McLean[1]													
(S94TX065-001)	0 to 4	A1	0.3	0.4	0.3	0.8	5	6.8	33.4	59.8	0.158	1.14	43.2
	4 to 7	A2	0.5	0.9	0.4	0.8	4.9	7.5	34.5	58.0	0.154	1.13	43.1
	7 to 15	Bss1	0.6	0.5	0.7	0.8	4.9	7.5	34.3	58.2	0.155	1.16	43.1
	15 to 21	Bss2	0.8	0.7	0.4	0.9	5.1	7.9	34.4	57.7	0.157	1.16	44.3
	21 to 37	Bss3	0.6	0.7	0.4	0.8	5	7.5	32.8	59.7	0.157	1.14	45.3

Table 31.--Physical Analyses of Selected Soils--Continued

Soil Name and Sample number	Depth	Horizon	Particle size distribution (percent less than 2 mm): Sand: Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very Fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Cm										Cm/cm	g/cc	Pct. (wt)
McLean[1]	37 to 42	Bss4	0.7	1	0.5	0.6	4.7	7.5	34	58.5	0.152	1.15	43.9
	42 to 59	Bss5	0.5	0.6	0.4	0.7	4.8	7	34.2	58.8	0.159	1.14	45.1
	59 to 72	Bkss1	0.3	0.4	0.4	0.7	5.6	7.4	37.5	55.1	0.161	1.13	46.5
	72 to 80	Bkss2	0.4	0.3	0.3	0.8	8	9.8	36.6	53.6	0.131	1.25	39.5
Pantex[1] (S93TX065-002)	0 to 7	Ap	tr	0.1	0.2	1.4	10.6	12.3	53.8	33.9	0.059	1.43	25.8
	7 to 20	Bt1	tr	tr	0.2	1.4	8.3	9.9	48	42.1	0.089	1.38	30.3
	20 to 34	Bt2	0.2	0.1	0.3	1.2	9.3	11.1	47.4	41.5	0.093	1.38	31
	34 to 49	Bt3	0.4	0.2	0.3	1.4	10.7	13	47.6	39.4	0.076	1.38	30.3
	49 to 60	Bt4	0.3	0.2	0.2	1.7	13.7	16.1	44.8	39.1	0.067	1.39	30.6
	60 to 71	Bt5	0.1	0.1	0.1	2.5	15.5	18.3	45.2	36.5	0.067	1.35	30.6
	71 to 80	Btk	tr	0.1	0.2	1.6	10.9	12.8	47.1	40.1		1.45	23.8
Plemons[1,4] (S97TX375-001)	0 to 6	A	0.5	0.4	0.7	7.1	24.8	33.5	45.1	21.4	---	---	---
	6 to 13	Btk1	0.9	0.6	0.8	4.8	18.1	25.2	43.1	31.7	---	---	---
	13 to 24	Btk2	0.5	0.6	0.8	4.7	14.3	20.9	48.3	30.8	0.033	1.36	21
	24 to 36	Btk3	0.9	0.5	0.5	6.2	21.1	29.2	42.8	28	0.038	1.48	21
	36 to 46	Btk4	0.7	0.4	0.6	6.7	21.7	30.1	38	31.9	0.039	1.47	22.1
	46 to 58	Btk5	0.6	0.8	0.7	3	14.9	20	43.1	36.9	0.049	1.46	24.3
	58 to 76	Btk6	0.6	0.4	0.3	3.8	16.5	21.6	43.4	35	0.041	1.38	26.6
	76 to 80	Btkb	tr	0.1	0.2	5.6	15.6	21.5	33.5	45	0.047	1.36	28.9
Pullman[1,5] (S97TX153-001)	0 to 7	Ap	tr	0.1	1.1	10.4	14.3	25.9	45.9	28.2	0.026	1.34	25.8
	7 to 15	Bt1	tr	0.1	1	8.6	11.1	20.8	31.5	47.7	0.064	1.32	32.7
	15 to 22	Bt2	0.1	tr	1	8.4	10.6	20.1	33	46.9	0.079	1.33	33.1
	22 to 29	Bt3	tr	0.1	0.9	9.5	11.2	21.7	33.6	44.7	0.085	1.34	33.3
	29 to 42	Btk1	0.1	0.1	0.8	7.9	11	19.9	34.5	45.6	0.093	1.34	32.1
	42 to 48	Btk2	0.1	0.1	0.7	7.7	11.6	20.2	32.1	47.7	0.112	1.28	34.3
	48 to 59	Bk	0.1	0.3	1.3	8.6	9.2	19.5	35.2	45.3	0.033	1.28	26

Table 31.--Physical Analyses of Selected Soils--Continued

Soil Name and Sample number	Depth	Horizon	Particle size distribution (percent less than 2 mm): Sand: Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very Fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Inches										cm/cm	g/cc	Pct. (wt)
	59 to 72	B'tk1	0.4	0.4	1	9.1	10.6	21.5	37	41.5	0.03	1.38	24
	72 to 80	B'tk2	0.7	0.4	1	9.2	10.4	21.7	38	40.3	0.039	1.32	26.4
Randall[1,2,6] (S97TX153-003)	0 to 3	A1	tr	0.1	0.2	1.8	5.2	7.3	36.1	56.6	0.108	1.22	35.9
	3 to 9	A2	tr	tr	0.3	2.3	5.1	7.7	29.4	62.9	0.114	1.2	36.8
	9 to 17	Bw	0.2	0.1	0.2	2.3	5.2	8	29.3	62.7	0.125	1.18	38.3
	17 to 38	Bss1	---	tr	0.3	2.6	5.4	8.3	30.1	61.6	0.128	1.2	38.7
	38 to 51	Bss2	---	tr	0.2	2	5.1	7.3	30.1	62.6	0.126	1.19	39.8
	51 to 62	Bss3	0.1	0.1	0.2	1.7	4.8	6.9	31.2	61.9	0.109	1.21	38.5
	62 to 80	Bkss	0.2	0.1	0.1	1.4	4.8	6.6	31.1	62.3	0.119	1.17	40.4

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 This pedon is outside the range of characteristics of the Randall series because the clay percentage is slightly above the fine range.

3 Pedon is in Parmer County, Texas; from the intersection of State Highway 145 and Farm Road 1172 near Lazbuddie, Texas; 14 kilometers (8.7 miles) north on Farm Road 1172; 3.2 kilometers (2 miles) east on county road; 0.3 kilometer (0.2 mile) north on county road; 1 kilometer (0.6 mile) east on county road; 0.5 kilometer (0.3 mile) north into crop field. Latitude—34 degrees, 30 minutes, 17.2 seconds N; Longitude—102 degrees, 32 minutes, 34.0 seconds W; Tam Anne, Texas USGS quad; NAD 83.

4 Pedon is in Potter County, Texas; 800 meters (0.5 miles) north of the intersection of State Highway 136 and Farm Road 293 on State Highway 136, 160 meters (0.1 mile) west-northwest in rangeland; Latitude—35 degrees, 21 minutes, 40.2 seconds N; Longitude—101 degrees, 38 minutes, 34 seconds W; Mayer, Texas USGS quad; NAD 83.

5 Pedon is in Deaf Smith County, Texas; from the intersection of U.S. Highway 385 and U.S. Highway 60 in Hereford; 18.5 kilometers (11.5 miles) north on Highway 385; 305 meters (1,000 feet) east in cultivated field; Latitude—34 degrees, 58 minutes, 28.5 seconds N; Longitude—102 degrees, 24 minutes, 02.2 seconds W; Milo Center, Texas USGS quad; NAD 83.

6 Pedon is in Floyd County, Texas; from the intersection of Farm Road 784 and U.S. Highway 70 in Floydada; 6.9 kilometers (4.3 miles west) on Farm Road 784; 1.8 kilometers (1.1 miles) south on ranch road; 91 meters (300 feet) south in playa (Bois D-Arc Lake); Latitude—33 degrees, 57 minutes, 44.13 seconds N; Longitude—101 degrees, 24 minutes, 57.72 seconds W; Sandhill, Texas USGS quad; NAD 83.

Table 32.--Chemical Analyses of Selected Soils

Soil Name and Sample number	Depth	Horizon	Extractable Bases Ca[3]	Mg	Na	K	Sum	CEC7	Electrical Conductivity	Base Saturation	Organic Carbon [4]	pH (1:1 H2O)	CaCO3	SAR
	Inches		Meq/100 g						dS/m	Percent	Percent		Percent	Percent
Alibates[1,2]														
(S97TX065-002)	0 to 7	A	11.4	2.3	0.3	0.6	14.6	14.7	---	99	0.78	7.4	tr	---
	7 to 18	Bt1	16.3	3.3	0.4	0.6	20.6	20.3	---	100	0.85	7.8	tr	---
	18 to 27	Bt2	47.4	2.7	0.4	0.4	50.9	11.8	---	100	0.41	8.2	5.0	---
	27 to 39	Btk1	39.6	3.1	0.5	0.5	43.7	9.9	---	100	0.32	8.3	3.0	---
	39 to 61	Btk2	28.0	3.9	0.5	---	32.4	9.6	---	100	0.10	8.3	2.0	---
	61 to 75	Btk3	12.1	3.9	0.5	0.3	16.8	7.1	---	100	0.05	8.6	1.0	---
	75 to 80	Btk4	40.4	3.3	0.5	0.3	44.5	4.5	---	100	0.17	8.9	6	---
Lazbuddie[1,2,5]														
(S06TX369-002)	0 to 3	Ap	59.6	4.0	---	2.5	66.1	29.8	0.86	100	1.39	7.9	4	tr
	3 to 13	Bss1	60.8	3.7	0.1	1.4	66.0	29.8	---	100	1.07	7.9	6	---
	13 to 34	Bss2	61.3	3.5	0.8	1.2	66.8	29.7	0.45	100	0.89	8.0	4	2
	34 to 53	Bss3	55.9	4.1	1.0	1.2	62.2	28.8	0.75	100	0.51	8.0	6	2
	53 to 80	Bkk	47.2	2.1	0.5	0.4	50.2	10.1	1.28	100	0.40	8.1	60	3.0
Manson[1,2]														
(S97TX065-001)	0 to 6	A	51.3	1.7	0.2	0.6	53.8	18.2	0.76	100	2.14	7.6	5	tr
	6 to 14	Bw	53.9	2.2	0.3	0.6	57.0	16.6	0.53	100	1.35	8.2	12	tr
	14 to 22	Btk1	54.5	3.7	0.3	0.5	59.0	16.4	---	100	1.07	8.3	23	---
	22 to 39	Btk2	51.4	7.0	0.7	0.7	59.8	16.8	---	100	0.41	8.5	23	---
	39 to 46	Btk3	50.3	8.2	1.2	0.8	60.5	18.9	---	100	0.16	8.6	7	---
	46 to 63	Btk4	49.2	4.9	1.4	0.5	56.0	15.1	0.57	100	0.10	8.7	27	4
	63 to 76	Btk5	49.7	7.8	1.7	0.8	60.0	17.6	1.04	100	0.25	8.5	21	4.0
	76 to 80	2Btk6	52.5	9.4	2.2	0.9	65.0	23.3	1.02	100	0.20	8.4	13	4.0
McLean[1]														
(S94TX065-001)	0 to 4	A1	---	3.8	0.2	2.5	---	37.4	0.53	100	0.94	7.9	1	tr
	4 to 7	A2	---	3.7	0.2	2.3	---	36.8	0.38	100	0.56	8	2	tr
	7 to 15	Bss1	---	3.3	0.3	1.8	---	35.8	---	100	0.49	7.8	2	---
	15 to 21	Bss2	---	3.4	0.3	1.6	---	36	---	100	0.41	8	4	---
	21 to 37	Bss3	---	3.1	0.4	1.5	---	36.6	---	100	0.38	8	2	---
	37 to 42	Bss4	---	3.5	0.4	1.4	---	36.3	---	100	0.35	8	3	---

Table 32.--Chemical Analyses of Selected Soils--Continued

Soil Name and Sample number	Depth	Horizon	Extractable Bases Ca[3]	Mg	Na	K	Sum	CEC7	Electrical Conductivity	Base Saturation	Organic Carbon [4]	pH (1:1 H2O)	CaCO3	SAR
	Inches	Meq/100 g							dS/m	Percent	Percent		Percent	Percent
McLean[1]	42 to 59	Bss5	---	3.4	0.4	1.3	---	36.3	---	100	0.33	8.1	2	---
	59 to 72	Bkss1	---	4	0.4	1.4	---	35.3	---	100	0.27	8.1	4	---
	72 to 80	Bkss2	---	4.1	0.5	1.3	---	31.5	---	100	0.2	8.1	5	---
Pantex[1]														
(S93TX065-002)	0 to 7	Ap	15.8	4.9	0.2	1.9	22.8	23.9	---	95	1.36	7.5	---	---
	7 to 20	Bt1	---	6.2	1	1	---	28.8	0.47	100	0.62	8.1	1	2
	20 to 34	Bt2	---	5.8	1.7	0.8	---	26.4	0.61	100	0.37	8.4	4	4
	34 to 49	Bt3	---	5.1	1.6	1	---	26.1	0.9	100	0.26	8.2	2	4
	49 to 60	Bt4	---	4.6	1.7	0.9	---	25.2	1.19	100	0.21	8.1	1	3
	60 to 71	Bt5	27.1	4.3	1.6	0.7	33.7	25.1	1.53	100	0.18	8	tr	3
	71 to 80	Btk	---	2.8	1.1	0.4	---	13.6	1.91	100	0.11	8	43	3
Plemons[1,2,6]														
(S97TX375-001)	0 to 6	A	---	1.9	0.3	1.1	---	17.8	0.62	100	---	7.9	8	tr
	6 to 13	Btk1	---	2.1	0.3	0.7	---	16.3	0.52	100	---	8.2	20	tr
	13 to 24	Btk2	---	4	0.4	0.7	---	13.9	0.38	100	---	8.3	26	1
	24 to 36	Btk3	---	6.2	0.5	0.4	---	16.2	---	100	---	8.4	10	---
	36 to 46	Btk4	---	7.2	0.8	0.7	---	16.9	---	100	---	8.5	12	---
	46 to 58	Btk5	---	8.6	1.3	0.7	---	20.4	0.7	100	---	8.4	10	3
	58 to 76	Btk6	---	9.1	1.5	1	---	22	0.75	100	---	8.4	5	3
	76 to 80	Btkb	29.5	11.4	2	1.1	44	30.2	0.94	100	---	8.2	tr	3
Pullman[1,7]														
(S97TX153-001)	0 to 7	Ap	14.3	3	0.1	1.5	18.9	19.6	0.95	96	1.49	6.8	---	1
	7 to 15	Bt1	---	6.5	0.7	1.7	---	32.2	0.55	100	0.74	7.9	1	2
	15 to 22	Bt2	---	6.7	1.2	1.9	---	30.6	0.64	100	0.63	8.3	2	3
	22 to 29	Bt3	---	6.9	1.8	1.8	---	28.4	1.35	100	0.48	8.3	4	5
	29 to 42	Btk1	---	6.9	3.4	3.3	---	30	5.15	100	0.29	7.9	3	5
	42 to 48	Btk2	---	7.2	3	1.8	---	30.1	5.62	100	0.25	7.8	2	4
	48 to 59	Bk	---	3	1.3	0.5	---	11	5.12	100	0.17	7.8	51	3
	59 to 72	B'tk1	---	3	1.1	1	---	12.7	2.96	100	0.09	8.1	53	4
	72 to 80	B'tk2	---	3.1	0.9	1.2	---	12.8	2.82	100	0.09	8.1	52	4

Table 32.--Chemical Analyses of Selected Soils--Continued

Soil Name and Sample number	Depth	Horizon	Extractable Bases					CEC7	Electrical Conductivity	Base Saturation	Organic Carbon [4]	pH (1:1 H2O)	CaCO3	SAR
			Ca[3]	Mg	Na	K	Sum							
	Inches	Meq/100 g							dS/m	Percent	Percent		Percent	Percent
Randall[1,8]														
(S97TX153-003)	0 to 3	A1	18.3	7.3	0.3	3.2	29.1	34.5	1.14	84	1.81	6.1	---	tr
	3 to 9	A2	21.4	7.8	0.4	3	32.6	35.1	---	93	0.61	6.9	---	---
	9 to 17	Bw	17.5	6.1	0.1	2.4	26.1	35.2	---	74	0.56	6.8	---	---
	17 to 38	Bss1	20.6	7.2	0.1	2.5	30.4	34.6	---	88	0.5	6.9	---	---
	38 to 51	Bss2	23.2	7.1	0.2	2	32.5	34.9	---	93	0.41	6.9	---	---
	50 to 62	Bss3	31.1	7.7	0.4	2.6	41.8	35.4	---	100	0.25	8	tr	---
	62 to 80	Bkss	---	7.7	---	2.5	35.2	35.2	---	100	0.19	8.2	2	---

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 Organic carbon estimated from total carbon.

3 Extractable Ca may contain Ca from calcium carbonate or gypsum.

4 Multiply organic carbon by 1.72 to obtain percent organic matter.

5 Pedon is in Parmer County, Texas; from the intersection of State Highway 145 and Farm Road 1172 near Lazbuddie, Texas; 14 kilometers (8.7 miles) north on Farm Road 1172; 3.2 kilometers (2 miles) east on county road; 0.3 kilometer (0.2 mile) north on county road; 1 kilometer (0.6 mile) east on county road; 0.5 kilometer (0.3 mile) north into crop field. Latitude—34 degrees, 30 minutes, 17.2 seconds N; Longitude—102 degrees, 32 minutes, 34.0 seconds W; Tam Anne, Texas USGS quad; NAD 83.

6 Pedon is in Potter County, Texas; 800 meters (0.5 miles) north of the intersection of State Highway 136 and Farm Road 293 on State Highway 136, 160 meters (0.1 mile) west-northwest in rangeland; Latitude—35 degrees, 21 minutes, 40.2 seconds N; Longitude—101 degrees, 38 minutes, 34 seconds W; Mayer, Texas USGS quad; NAD 83.

7 Pedon is in Deaf Smith County, Texas; from the intersection of U.S. Highway 385 and U.S. Highway 60 in Hereford; 18.5 kilometers (11.5 miles) north on Highway 385; 305 meters (1,000 feet) east in cultivated field; Latitude—34 degrees, 58 minutes, 28.5 seconds N; Longitude—102 degrees, 24 minutes, 02.2 seconds W; Milo Center, Texas USGS quad; NAD 83.

8 Pedon is in Floyd County, Texas; from the intersection of Farm Road 784 and U.S. Highway 70 in Floydada; 6.9 kilometers (4.3 miles west) on Farm Road 784; 1.8 kilometers (1.1 miles) south on ranch road; 91 meters (300 feet) south in playa (Bois D-Arc Lake); Latitude—33 degrees, 57 minutes, 44.13 seconds N; Longitude—101 degrees, 24 minutes, 57.72 seconds W; Sandhill, Texas USGS quad; NAD 83.

Table 33.--Clay Mineralogy of Selected Soils

Soil name and Sample number			Percentage of clay minerals (x-ray diffraction)[2]							
Depth		Horizon	Smectite	Mica	Kaolinite	Quartz	Calcite	Smectite-Mica	Vermiculite	Hematite
	Inches									
Alibates[1]										
(S97TX065-002)	18 to 27	Bt2	2	3	2	1	2	---	---	---
Lazbuddie[1,4]										
(S06TX369-002)	3 to 13	Bss1	---	2	2	1	1	---	1	---
	34 to 53	Bss3	---	2	2	1	2	---	---	---
Manson[1]										
(S97TX065-001)	22 to 39	Btk2	2	2	2	1	3	---	---	---
McLean[1]										
(S94TX065-001)	0 to 4	A1	3	2	2	1	---	---	---	---
	15 to 21	Bss2	3	2	2	2	---	---	---	---
	37 to 42	Bss4	3	2	2	2	---	---	---	---
Pantex[1]										
(S93TX065-002)	0 to 7	Ap	1	3	2	1	---	1	1	---
	39 to 49	Bt3	1	2	2	1	1	1	1	1
	60 to 71	Bt5	---	2	2	1	---	1	1	---
	71 to 80	Btk	1	2	2	---	4	1	1	---
Plemons[1, 5]										
(S97TX375-001)	13 to 24	Btk2	2	2	2	1	4	2	---	---
Pullman[1,3,6]										
(S97TX153-001)	7 to 15	Bt1	3	2	2	1	1	---	---	---
	15 to 22	Bt2	3	2	2	1	1	---	---	---
	22 to 29	Bt3	3	2	2	1	1	---	---	---
	29 to 42	Btk1	2	2	2	1	1	---	---	---
	42 to 48	Btk2	3	2	2	1	1	---	---	---
	59 to 72	B'tk1	2	1	1	---	---	---	---	---
	72 to 80	B'tk2	2	1	1	---	---	---	---	---
Randall[1,7]										
(S97TX153-003)	0 to 3	A1	2	3	2	1	---	---	---	---

Table 33.--Clay Mineralogy of Selected Soils--Continued

Soil name and Sample number	Depth	Horizon	Smectite	Mica	Kaolinite	Quartz	Calcite	Smectite-Mica	Vermiculite	Hematite
			Percentage of clay minerals (x-ray diffraction)							
	Inches									
Randall[1,7]	9 to 17	Bw	2	3	2	1	---	---	---	---
(S97TX153-003)	17 to 38	Bss1	2	3	2	1	---	---	1	---
	38 to 51	Bss2	2	2	2	1	---	---	---	---

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 Clay minerals for soils are given as relative amounts, as follows: 1--trace; 2--small, 3--moderate; 4--abundant; 5—dominant.

3 This pedon is outside the range of characteristics of the Pullman series because it has a higher percentage of smectite clays.

4 Pedon is in Parmer County, Texas; from the intersection of State Highway 145 and Farm Road 1172 near Lazbuddie, Texas; 14 kilometers (8.7 miles) north on Farm Road 1172; 3.2 kilometers (2 miles) east on county road; 0.3 kilometer (0.2 mile) north on county road; 1 kilometer (0.6 mile) east on county road; 0.5 kilometer (0.3 mile) north into crop field. Latitude—34 degrees, 30 minutes, 17.2 seconds N; Longitude—102 degrees, 32 minutes, 34.0 seconds W; Tam Anne, Texas USGS quad; NAD 83.

5 Pedon is in Potter County, Texas; 800 meters (0.5 mile) north of the intersection of State Highway 136 and Farm Road 293 on State Highway 136, 160 meters (0.1 mile) west-northwest in rangeland; Latitude—35 degrees, 21 minutes, 40.2 seconds N; Longitude—101 degrees, 38 minutes, 34 seconds W; Mayer, Texas USGS quad; NAD 83.

6 Pedon is in Deaf Smith County, Texas; from the intersection of U.S. Highway 385 and U.S. Highway 60 in Hereford; 18.5 kilometers (11.5 miles) north on Highway 385; 305 meters (1,000 feet) east in cultivated field; Latitude—34 degrees, 58 minutes, 28.5 seconds N; Longitude—102 degrees, 24 minutes, 02.2 seconds W; Milo Center, Texas USGS quad; NAD 83.

7 Pedon is in Floyd County, Texas; from the intersection of Farm Road 784 and U.S. Highway 70 in Floydada; 6.9 kilometers (4.3 miles west) on Farm Road 784; 1.8 kilometers (1.1 miles) south on ranch road; 91 meters (300 feet) south in playa (Bois D-Arc Lake); Latitude—33 degrees, 57 minutes, 44.13 seconds N; Longitude—101 degrees, 24 minutes, 57.72 seconds W; Sandhill, Texas USGS quad; NAD 83.

Table 34.--Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Ady	Fine-loamy, mixed, superactive, thermic Aridic Haplustalfs
Alibates	Fine-loamy, mixed, superactive, thermic Aridic Argiustolls
Bippus	Fine-loamy, mixed, superactive, thermic Cumulic Haplustolls
Burson	Loamy, mixed, superactive, calcareous, thermic, shallow Ustic Torriorthents
Estacado	Fine-loamy, mixed, superactive, thermic Aridic Paleustolls
Guadalupe	Coarse-loamy, mixed, active, thermic Fluventic Haplustepts
Laverne	Loamy-skeletal, mixed, superactive, thermic, shallow Petrocalcic Calciustolls
Lazbuddie	Fine, smectitic, thermic Calcic Haplusterts
Likes	Mixed, calcareous, thermic Aridic Ustipsamments
Lincoln	Sandy, mixed, thermic Typic Ustifluvents
Lockney	Fine, smectitic, thermic Typic Haplusterts
Lofton	Fine, mixed, superactive, thermic Vertic Argiustolls
Manson	Fine-loamy, mixed, superactive, thermic Calcidic Paleustolls
McLean	Very-fine, smectitic, thermic Udic Haplusterts
Mobeetie	Coarse-loamy, mixed, superactive, thermic Aridic Haplustepts
Paloduro	Fine-loamy, mixed, superactive, thermic Aridic Haplustolls
Pantex	Fine, mixed, superactive, thermic Torrertic Paleustolls
Pep	Fine-loamy, mixed, superactive, thermic Aridic Calciustolls
Plemons	Fine-silty, mixed, superactive, thermic Calcidic Paleustalfs
Potter	Loamy-skeletal, carbonatic, thermic, shallow Petronodic Ustic Haplocalcids
Pullman	Fine, mixed, superactive, thermic Torrertic Paleustolls
Quinlan	Loamy, mixed, superactive, thermic, shallow Typic Haplustepts
Randall	Very-fine, smectitic, thermic Ustic Epiaquerts
Springer	Coarse-loamy, mixed, active, thermic Typic Paleustalfs
Tascosa	Loamy-skeletal, mixed, superactive, thermic Aridic Calciustolls
Texroy	Fine-loamy, mixed, superactive, thermic Pachic Argiustolls
Tivoli	Mixed, nonacid, thermic Typic Ustipsamments
Veal	Coarse-loamy, carbonatic, thermic Aridic Calciustepts
Veal	Fine-loamy, carbonatic, thermic Aridic Calciustepts
Zita	Fine-loamy, mixed, superactive, thermic Aridic Haplustolls

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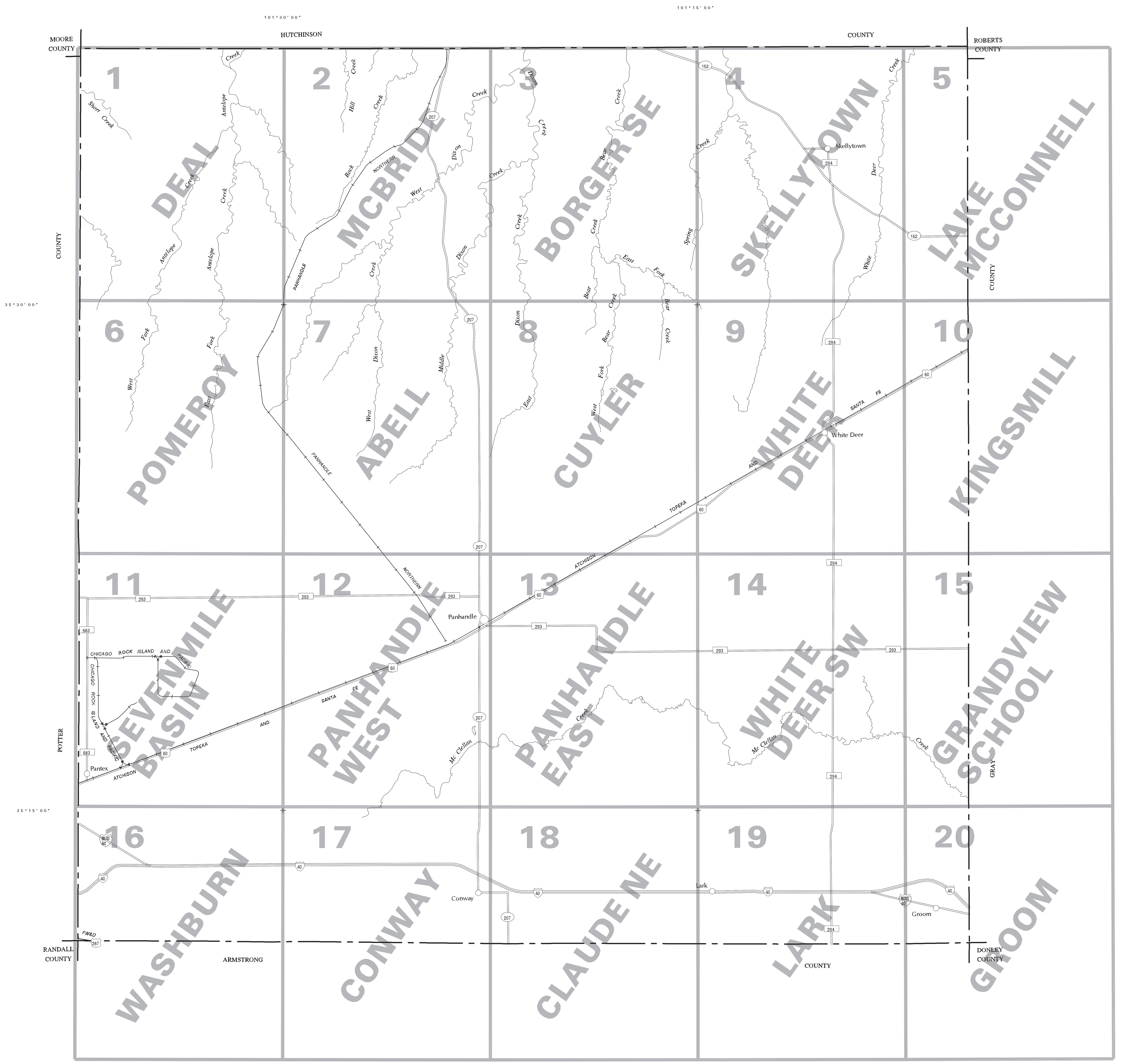


INDEX TO MAP SHEETS
CARSON COUNTY, TEXAS

MILES

KILOMETERS

SCALE = 1:125000

SOIL LEGEND

Soil map symbols are in alphabetical order. The first letter, always a capital, is the initial letter of the soil series or miscellaneous area name. The second letter is lowercase, except in associations, undifferentiated groups, and miscellaneous areas which all use capital letters from the soil series or miscellaneous area name. The third letter, if present, represents slope class.

SYMBOL	NAME
AdB	Ady fine sandy loam, 1 to 3 percent slopes
AdC	Ady fine sandy loam, 3 to 5 percent slopes
AtA	Alibates loam, 0 to 1 percent slopes
AtB	Alibates loam, 1 to 3 percent slopes
BcA	Bippus clay loam, 0 to 2 percent slopes, occcasionally flooded
BP	Borrow pits
BQG	Burson-Quinlan-Rock outcrop association, 8 to 45 percent slopes
EcA	Estacado clay loam, 0 to 1 percent slopes
EcB	Estacado clay loam, 1 to 3 percent slopes
GUA	Guadalupe soils, 0 to 2 percent slopes, occasionally flooded
LcA	Lazbuddie clay, 0 to 1 percent slopes
LkD	Likes loamy fine sand, 1 to 8 percent slopes
LNA	Lincoln soils, 0 to 1 percent slopes, frequently flooded
LoA	Lofton clay loam, 0 to 1 percent slopes
LrC	Laverne gravelly loam, 1 to 5 percent slopes
LyA	Lockney clay, 0 to 1 percent slopes
M-W	Miscellaneous water
McA	McLean clay, 0 to 1 percent slopes, occasionally ponded
MnB	Manson loam, 1 to 3 percent slopes
MoC	Mobeetie fine sandy loam, 3 to 5 percent slopes
MPD	Manson-Paloduro association, 1 to 8 percent slopes
MPE	Manson-Paloduro-Potter association, 3 to 12 percent slopes, eroded
MTE	Mobeetie-Tascosa association, 5 to 20 percent slopes
MVD	Mobeetie-Veal association, 3 to 8 percent slopes
MVE	Mobeetie-Veal-Potter association, 5 to 20 percent slopes
PcB	Pep clay loam, 1 to 3 percent slopes
PcC	Pep clay loam, 3 to 5 percent slopes
PGE	Potter soils, 3 to 20 percent slopes
PMG	Potter-Mobeetie association, 8 to 45 percent slopes
PnC	Plemons loam, 3 to 5 percent slopes
PuA	Pullman clay loam, 0 to 1 percent slopes
PuB	Pullman clay loam, 1 to 3 percent slopes
PxA	Pantex silty clay loam, 0 to 1 percent slopes
RaA	Randall clay, 0 to 1 percent slopes, frequently ponded
TeB	Texroy loam, 1 to 3 percent slopes
TSD	Tivoli-Springer association, 1 to 8 percent slopes
W	Water
ZcA	Zita clay loam, 0 to 1 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline and neatline
- Previously published survey

OTHER BOUNDARY

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEMS AND DESIGNATIONS

- Interstate — 173, 79 345
- Federal — 287, 410 224
- State — 52, 52 347
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

- Without road
- With road
- With railroad
- Single side slope

DAMS

- Medium or small — W

LANDFORM FEATURES

- Prominent hill or peak
- Soil sample site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house
- Church
- School
- Other religion — Mt Carmel
- Located object — Ranger Station
- Tank — Petroleum
- Lookout tower
- Oil and/or natural gas wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial stream, double line
- Perennial stream, single line
- Intermittent stream
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal — CANAL
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/or irrigation ditch

SMALL LAKES, PONDS, AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — AdB LkD

LANDFORM FEATURES

- Bedrock escarpment
- Other than bedrock escarpment
- Short steep slope
- Gully
- Depression, closed
- Sinkhole
- Borrow pit
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava spot
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

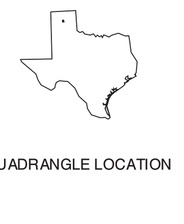
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
DEAL QUADRANGLE
SHEET NUMBER 1 OF 20

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the Natural Resources Conservation Service from 1996-1997 aerial photography. Hydrography and cultural features were acquired from NRCS and edited to conform with the features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION

SCALE 1:24000

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FEET

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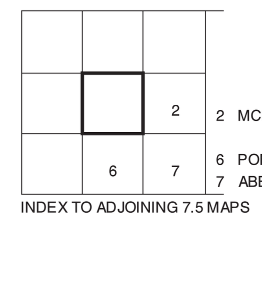
KILOMETERS



2 MCBRIDE
6 POMEROY
7 ABELL

INDEX TO ADJOINING 7.5 MAPS

DEAL, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 20

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
MCBRIDE QUADRANGLE
SHEET NUMBER 2 OF 20

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the Natural Resources Conservation Service from 1996-1997 aerial photography. Hydrography and cultural features were acquired from NRCS and edited to conform with the features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 DEAL
3 BORGER SE
6 POMEROY
7 ABELL
8 CUYLER

INDEX TO ADJOINING 7.5 MAPS

MCBRIDE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 20

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
BORGER SE QUADRANGLE
SHEET NUMBER 3 OF 20

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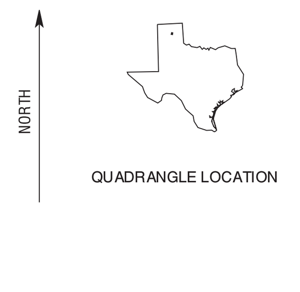
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



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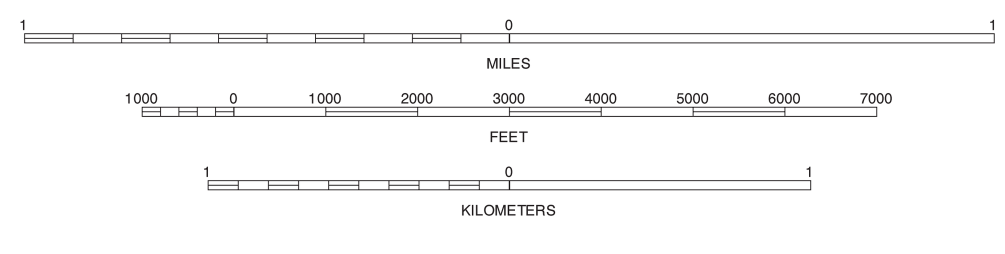

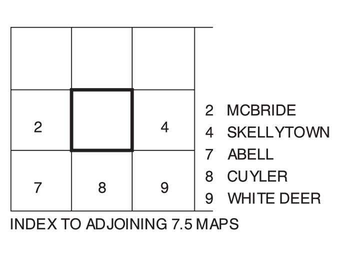

BORGER SE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 20

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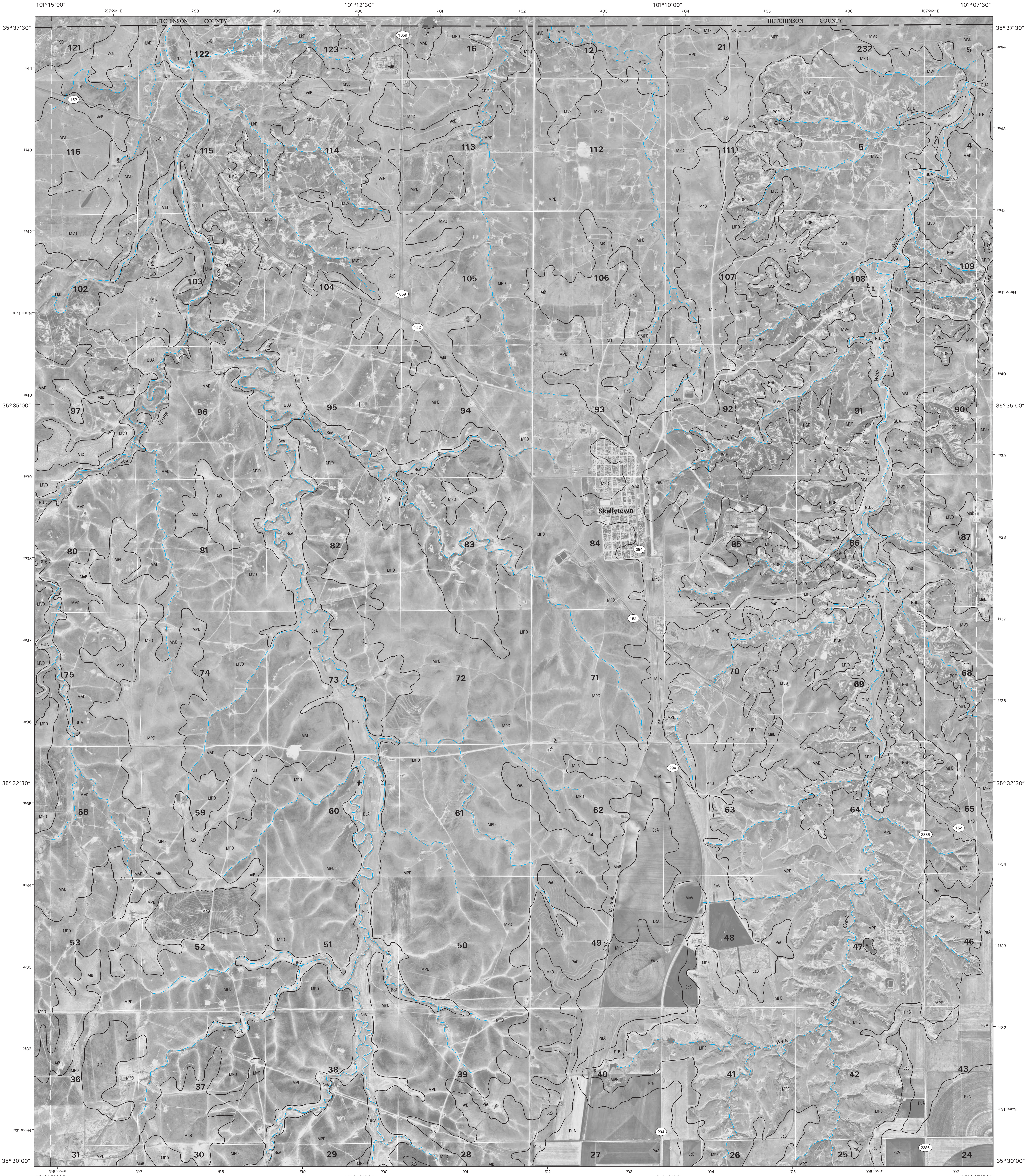
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
SKELLYTOWN QUADRANGLE
SHEET NUMBER 4 OF 20



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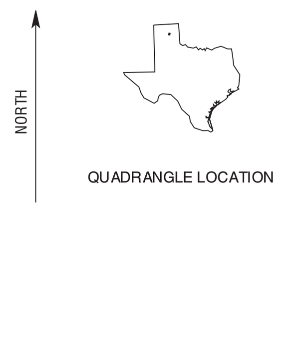
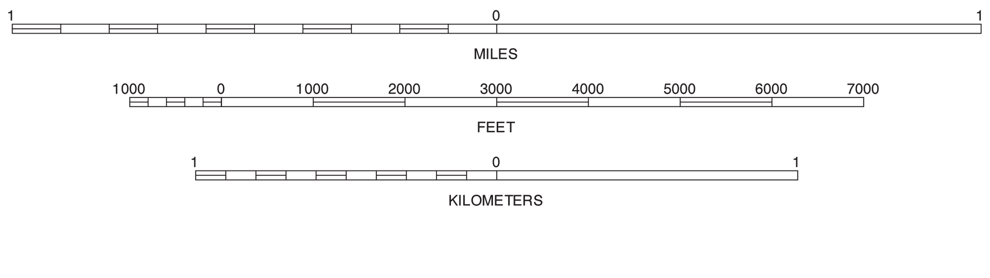
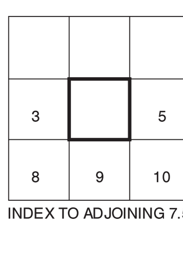
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION

SCALE 1:24000





3 BORGER SE
5 LAKE MCCONNELL
8 CUYLER
9 WHITE DEER
10 KINGSMILL

INDEX TO ADJOINING 7.5 MAPS

SKELLYTOWN, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
LAKE MCCONNELL QUADRANGLE
SHEET NUMBER 5 OF 20

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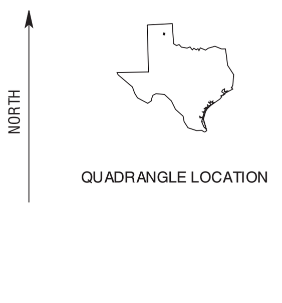
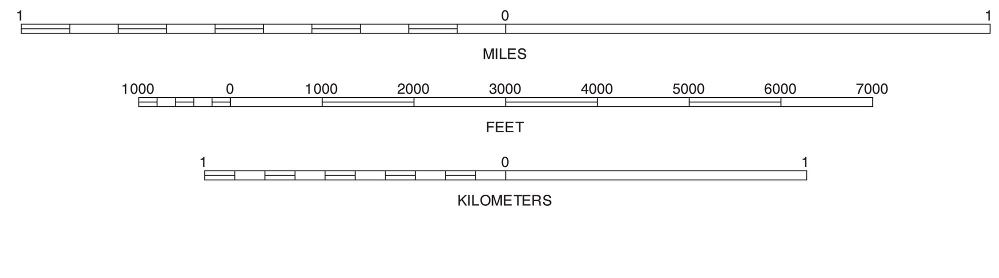
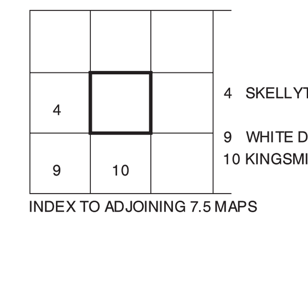
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION

SCALE 1:24000





4 SKELLYTOWN
9 WHITE DEER
10 KINGSMILL

INDEX TO ADJOINING 7.5 MAPS

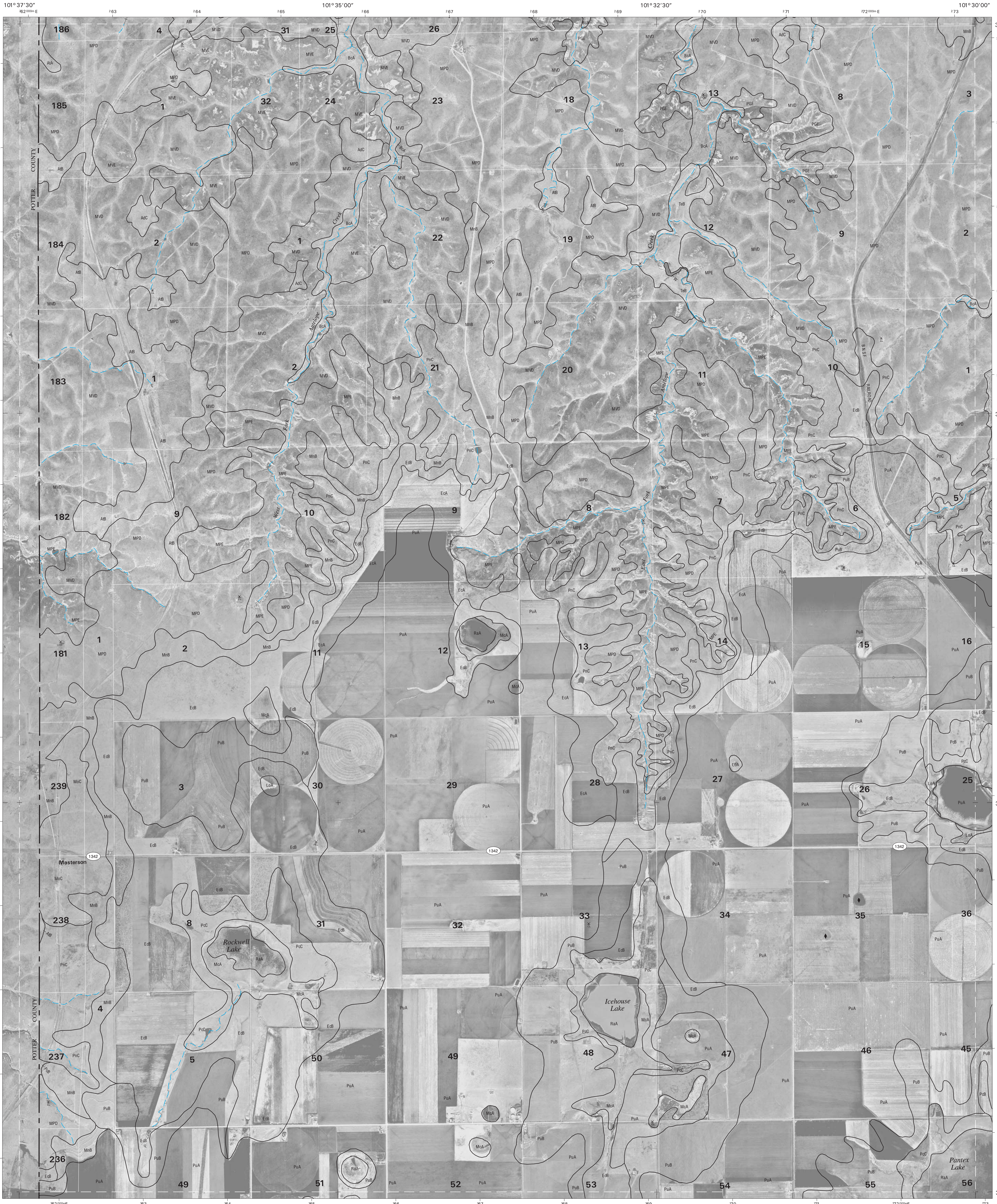
LAKE MCCONNELL, TEXAS

7.5 MINUTE SERIES
SHEET NUMBER 5 OF 20

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
POMEROY QUADRANGLE
SHEET NUMBER 6 OF 20



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

	1	2
		7
	11	12

1 DEAL
2 MCBRIDE
7 ABELL
11 SEVENMILE BASIN
12 PANHANDLE WEST

INDEX TO ADJOINING 7.5 MAPS

POMEROY, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 20

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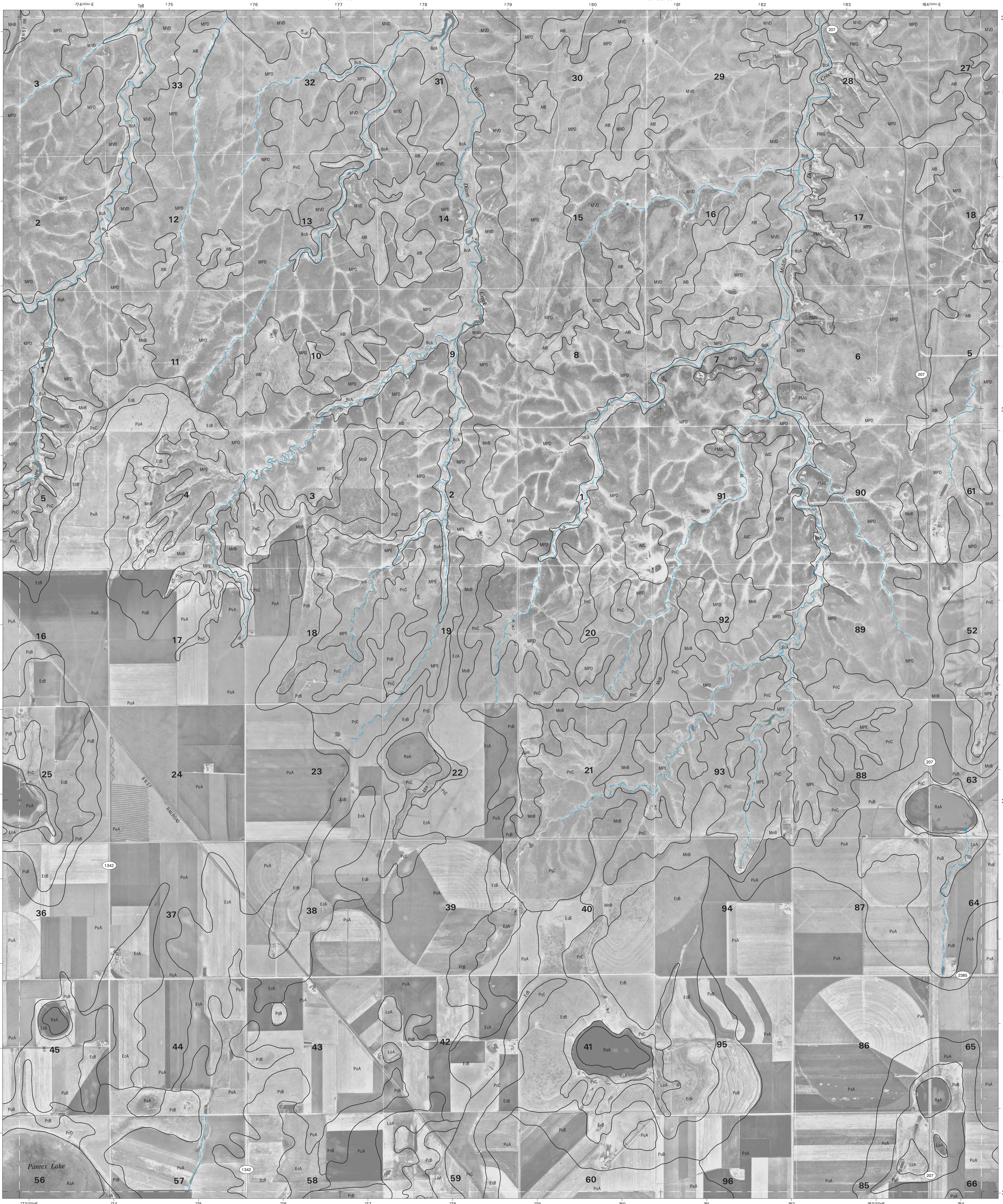
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
ABELL QUADRANGLE
SHEET NUMBER 7 OF 20



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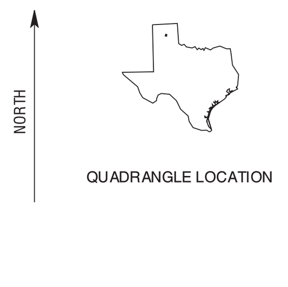

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
6		8
11	12	13

1 DEAL
2 MCBRIDE
3 BORGER SE
6 POMEROY
8 CUYLER
11 SEVENMILE BASIN
12 PANHANDLE WEST
13 PANHANDLE EAST

INDEX TO ADJOINING 7.5 MAPS

ABELL, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 20

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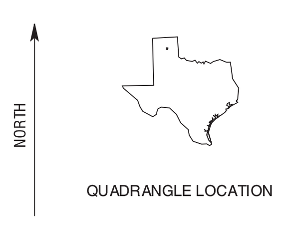

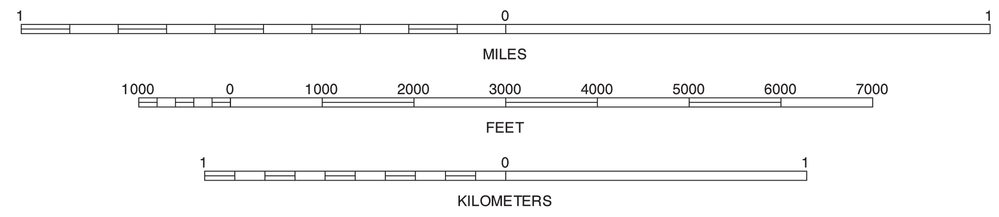

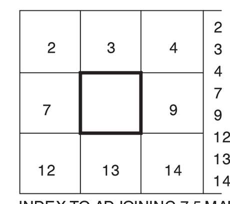

CUYLER, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 20

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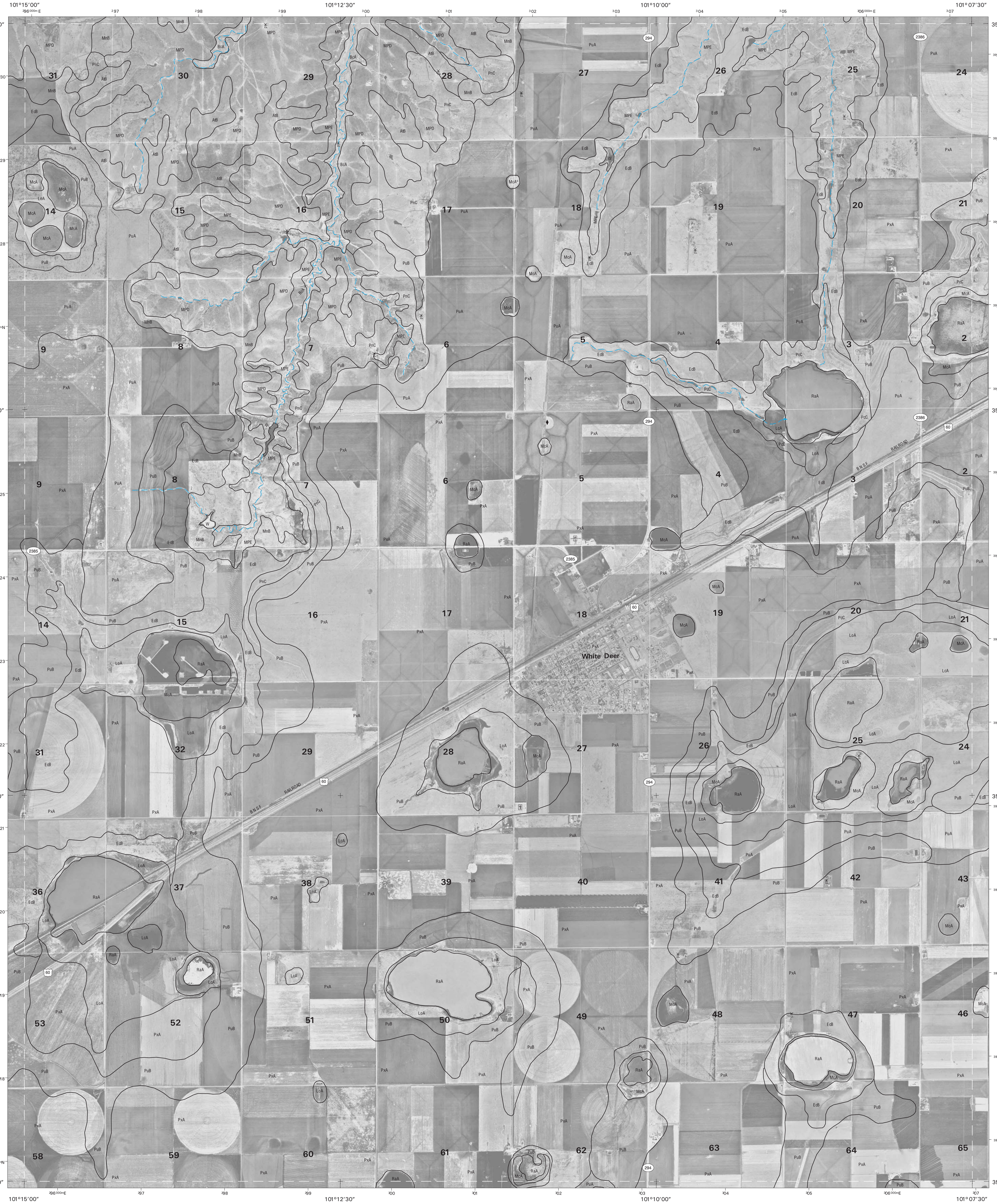
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
WHITE DEER QUADRANGLE
SHEET NUMBER 9 OF 20



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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

3	4	5
8		10
13	14	15

3 BORGER SE
4 SKELLYTOWN
5 LAKE MCCONNELL
8 CUYLER
10 KINGSMILL
13 PANHANDLE EAST
14 WHITE DEER SW
15 GRANDVIEW SCHOOL

INDEX TO ADJOINING 7.5 MAPS

WHITE DEER, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 20

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES: 1 0 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 0 1

4	5	
9		
14	15	

4 SKELLYTOWN
5 LAKE MCCONNELL
9 WHITE DEER
14 WHITE DEER SW
15 GRANDVIEW SCHOOL

INDEX TO ADJOINING 7.5 MAPS

KINGSMILL, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
SEVENMILE BASIN QUADRANGLE
SHEET NUMBER 11 OF 20

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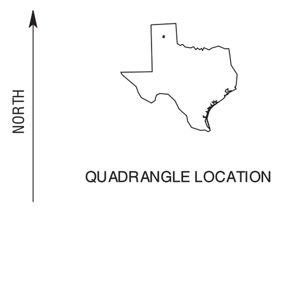

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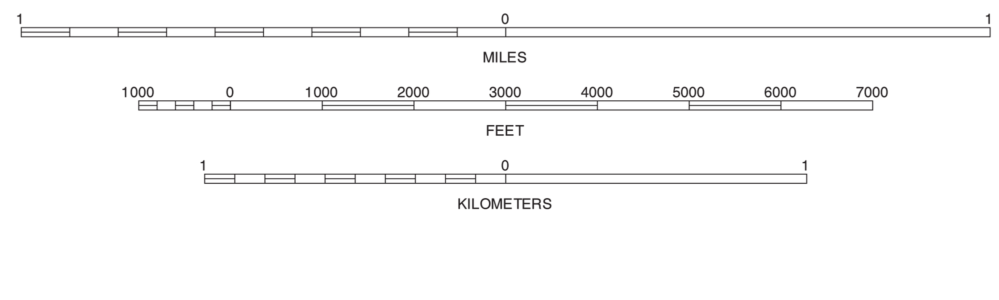

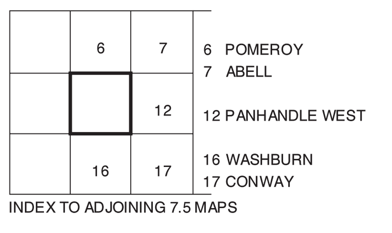

INDEX TO ADJOINING 7.5 MAPS

SEVENMILE BASIN, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
PANHANDLE WEST QUADRANGLE
SHEET NUMBER 12 OF 20

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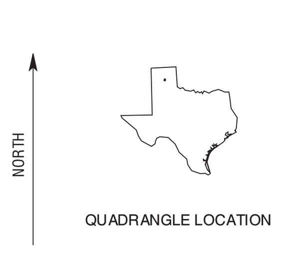
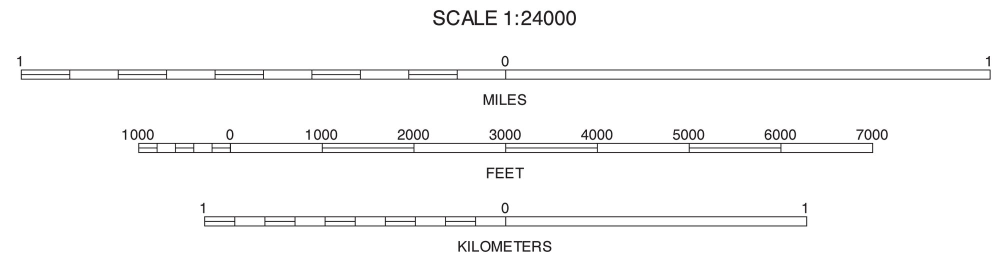


QUADRANGLE LOCATION

SCALE 1:24000



6	7	8
11		13
16	17	18

6 POMEROY
7 ABELL
8 CUYLER
11 SEVENMILE BASIN
13 PANHANDLE EAST
16 WASHBURN
17 CONWAY
18 CLAUDE NE

INDEX TO ADJOINING 7.5 MAPS

PANHANDLE WEST, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
PANHANDLE EAST QUADRANGLE
SHEET NUMBER 13 OF 20

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

7	8	9
12		14
17	18	19

7 ABELL
8 CUYLER
9 WHITE DEER
12 PANHANDLE WEST
14 WHITE DEER SW
17 CONWAY
18 CLAUDE NE
19 LARK

INDEX TO ADJOINING 7.5 MAPS

PANHANDLE EAST, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
WHITE DEER SW QUADRANGLE
SHEET NUMBER 14 OF 20

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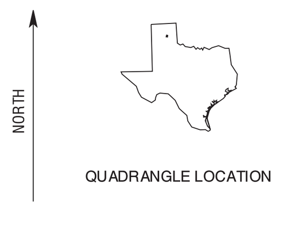
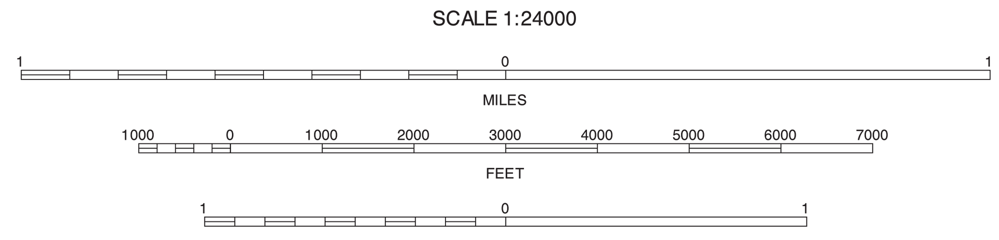
North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





8	9	10
13		15
18	19	20

8 CUYLER
9 WHITE DEER
10 KINGSMILL
13 PANHANDLE EAST
15 GRANDVIEW SCHOOL
18 CLAUDE NE
19 LARK
20 GROOM

INDEX TO ADJOINING 7.5 MAPS

WHITE DEER SW, TEXAS

7.5 MINUTE SERIES
SHEET NUMBER 14 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
GRANDVIEW SCHOOL QUADRANGLE
SHEET NUMBER 15 OF 20

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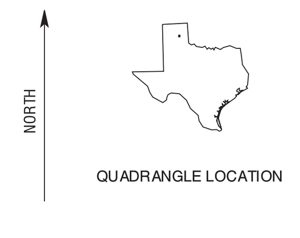

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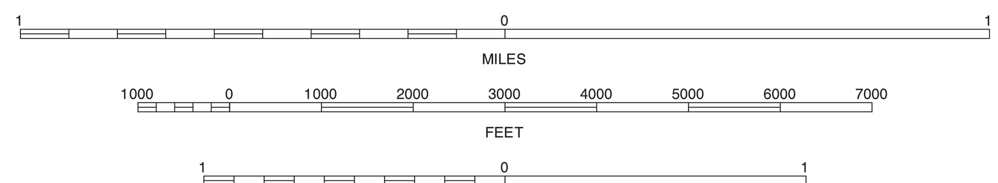

9	10	
14		
19	20	

9 WHITE DEER
10 KINGSMILL
14 WHITE DEER SW
19 LARK
20 GROOM

INDEX TO ADJOINING 7.5 MAPS

GRANDVIEW SCHOOL, TEXAS

7.5 MINUTE SERIES
SHEET NUMBER 15 OF 20

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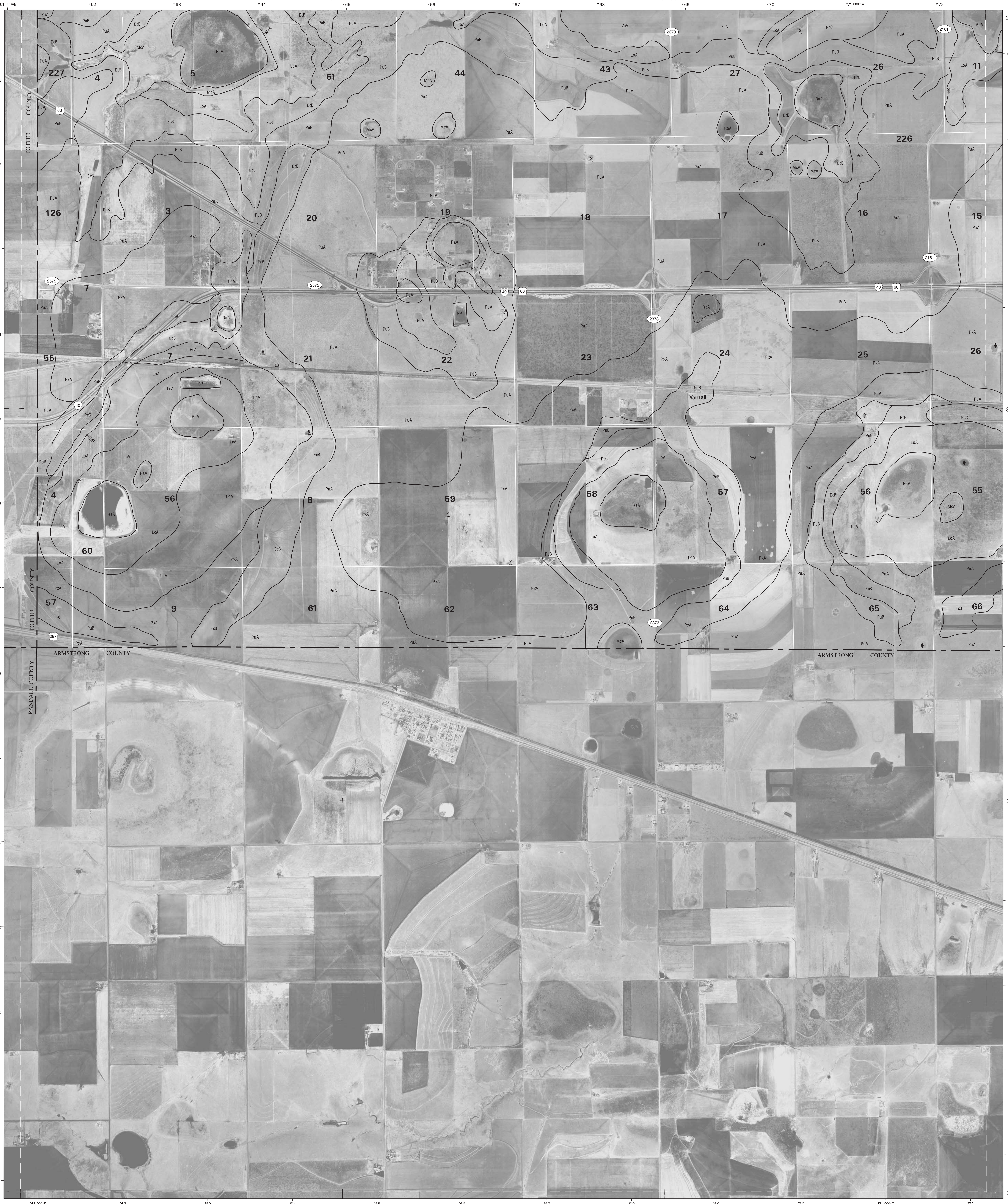
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
WASHBURN QUADRANGLE
SHEET NUMBER 16 OF 20



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

	11	12
		17

11 SEVENMILE BASIN
12 PANHANDLE WEST
17 CONWAY

INDEX TO ADJOINING 7.5 MAPS

WASHBURN, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
CONWAY QUADRANGLE
SHEET NUMBER 17 OF 20

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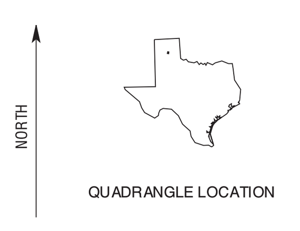
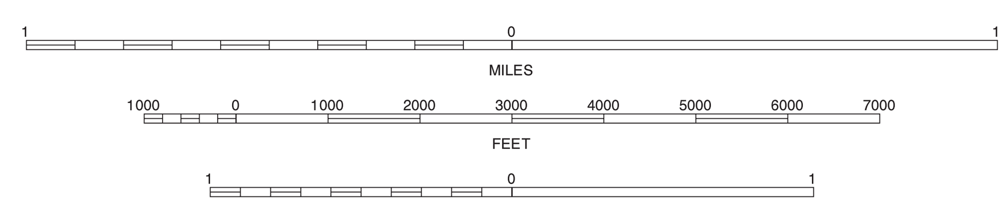
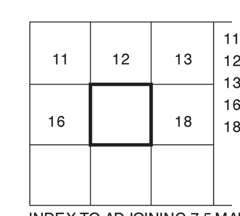


QUADRANGLE LOCATION

SCALE 1:24000





11 SEVENMILE BASIN
12 PANHANDLE WEST
13 PANHANDLE EAST
16 WASHBURN
18 CLAUDE NE

INDEX TO ADJOINING 7.5 MAPS

CONWAY, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 20

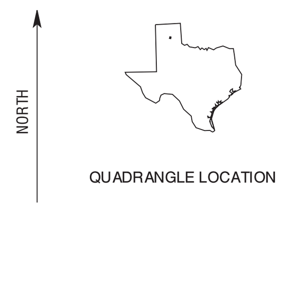
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

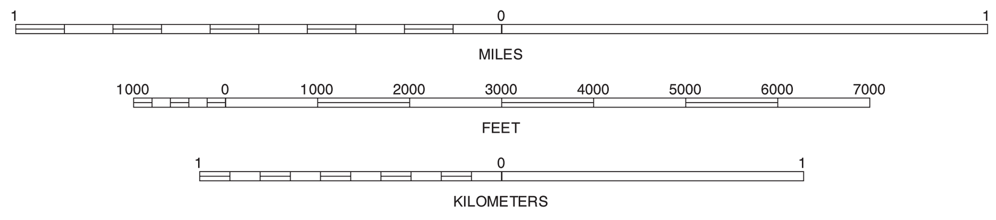
CARSON COUNTY, TEXAS
CLAUDE NE QUADRANGLE
SHEET NUMBER 18 OF 20

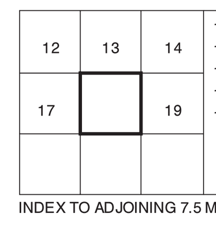
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the Natural Resources Conservation Service from 1996-1997 aerial photography. Hydrography and cultural features were acquired from NRCS and edited to conform with the features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



SCALE 1:24000





12 PANHANDLE WEST
13 PANHANDLE EAST
14 WHITE DEER SW
17 CONWAY
19 LARK

INDEX TO ADJOINING 7.5 MAPS

CLAUDE NE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 20

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

13	14	15
18		20

13 PANHANDLE EAST
14 WHITE DEER SW
15 GRANDVIEW SCHOOL
18 CLAUDE NE
20 GROOM

INDEX TO ADJOINING 7.5 MAPS

LARK, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 20

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CARSON COUNTY, TEXAS
GROOM QUADRANGLE
SHEET NUMBER 20 OF 20

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

14 WHITE DEER SW
15 GRANDVIEW SCHOOL
19 LARK

INDEX TO ADJOINING 7.5 MAPS

GROOM, TEXAS
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SHEET NUMBER 20 OF 20

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